The Influence of Social Recovery Capital and Stress on the Health and Well-Being of Individuals Recovering from Addiction

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THE INFLUENCE OF SOCIAL RECOVERY CAPITAL AND STRESS ON THE HEALTH AND WELL-BEING OF INDIVIDUALS RECOVERING FROM ADDICTION.

A dissertation
by

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ABSTRACT

Historically, recovery from addiction has been synonymous with sobriety and when a person relapsed, all the gains they had made were erased. More recently efforts are underway to redefine recovery as a multidimensional process of change characterized by abstinence, improved health, citizenship, and actions taken by individuals to reach their full potential. This study contributes to the evolution of a more holistic understanding of recovery across the life course by utilizing four waves of data from the Pathways to Long-Term Abstinence Study (N=355) to examine how social recovery capital, stress, and individual contextual factors shape the physical health, mental health, and well-being of individuals recovering from addiction. Results from growth curve analysis indicate that the mental health and well-being of those recovering from addiction improve over time, while their physical health declines. Evidence also confirms that the positive influences of social recovery capital extend beyond sobriety to both directly and

indirectly alter global health trajectories. While findings presented here offer hope that life can get better in some areas, they also raise significant concern over a long term pattern of declining physical health and the negative effects of stress that persist during recovery. A person's ability to sustain abstinence contributes to improvements in mental health and well-being, but not to physical health, suggesting that the physical damage done while actively abusing substances is significant and enduring. Finally, women recovering from addiction were confirmed to suffer disproportionate physical and mental health disparities, adding to the already substantial body of literature that suggests gender-specific prevention and treatment interventions across disciplines are needed to keep girls from becoming addicts and to better serve the unique needs of women who do. Given that social recovery capital is able to simultaneously influence multiple domains of recovery, interventions targeting enhancement of social recovery capital may prove particularly valuable in the effort to help people recover from addiction.

ACKNOWLEDGEMETNS

This dissertation is dedicated to my mother, Beverly Dean Subberra. She lived her life to the fullest, valuing laughter, love, and adventure. Every day she channeled compassion through her actions and showed me how important it is to help those in need. I am who I am because of her. I am also incredibly thankful and appreciative of the support received from my sister and father, both of whom have done everything in their power to make sure I had the resources necessary to live my life fully. Finally, I have to thank Chris, my husband, for supporting me in each and every way through the process of proposing and completing this dissertation. His love and sense of adventure fueled me, providing respite from the daily stresses of life and the demands of completing a dissertation.

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When I came to Boston College, I planned to study systems of care and child mental health. I owe a debt of gratitude to Chip Wilder and Katherine Grimes from the

MHSPY program for sharing their wisdom about systems of care and the value of peer support interventions. They lit a spark that became fully ignited when Scott Strode spoke to me about wanting to help people recover from addiction and live life to the fullest with the help of a sober active community made up of others committed to living a sober active lifestyle.

Per Ignem Ad Astra – Through Fire to the Stars

It has been an honor to work with Scott and the team at Phoenix Multisport to develop and evolve the Phoenix Multisport program and the Integrated Sober Active Community (ISAC) model. The work I've done with Phoenix raised the questions answered within this dissertation and inspired me to conduct research looking at how social factors influenced the physical health, mental health, and well-being of individuals recovering from addiction.

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CHAPTER ONE - Introduction

Purpose and Specific Aims

The purpose of this study is to generate knowledge that will inform the development of a comprehensive understanding of recovery from addiction by evaluating the influence of social components of recovery capital on the physical health, mental health, and well-being of individuals engaged in the process of recovery. The term "recovery" is used across numerous disciplines to reflect discipline-specific return to health. For the purpose of this paper, "recovery" is intended to mean recovery from addiction.

Recovery Capital (RC) is the extent of internal and external resources one can access and use to both initiate and sustain recovery (White & Kurtz, 2005; Granfield & Cloud, 2001). The theory of RC evolved out the study of Natural Recovery (recovery from addiction without engaging in any form of formal or informal substance abuse treatment) and the paradigm shift toward a model of resilience and recovery (Moos & Moos, 2007; White & Kurtz, 2005). Four domains of recovery capital have been identified as having an influence on the process of recovery over time: 1) cultural capital (values and beliefs associated with cultural group membership); 2) physical capital (economic and tangible assets); 3) human capital (acquired and inherited traits such as education and health); and 4) social capital (options and resources made available via relationships and social network membership) (Cloud & Granfield, 2008).

Research on the process of recovery and the function of recovery capital within the process of recovery is fairly new, with numerous gaps and limitations. Within the

science of recovery, researchers are just beginning to hypothesize about what recovery means, how people recover, what sorts of pathways they take to recover, what formal and informal treatment strategies, and recovery capital factors promote recovery over time. Historically recovery was synonymous with sobriety, but relying on sobriety as the sole outcome indicator for recovery overlooks the reality that recovery is a multidimensional construct where gains must be measured across broader recovery domains including physical health, mental health, and well-being.

This study aims to offer increased insight about the role social capital plays in influencing the global health (physical health, mental health, and well-being) of individuals engaged in the process of recovery from addiction to alcohol and/or drugs. For the purpose of this paper, I will not differentiate outcomes in relation to alcohol, specific types of drugs, or the legal or illegal nature of the substances abused. To shed light on common recovery pathways, this study examines these relationships as a function of sobriety status (sustained sobriety vs. relapse), socio-demographics (gender, marital status, education, minority status, and age), and substance use and substance treatment career factors (addiction severity, time sober, participation in substance abuse treatment ever). Through the use of latent growth curve modeling statistical techniques the research presented here elucidate global health trajectories as well as individual and social factors that shape those trajectories. Recognizing that stress and exposure to stressful life events are often cited as factors triggering relapse (McMahon, 2001, Laudet, Magura, Vogel, & Knight, 2004; Krueger, 1981), this study also examines the influence of stress on the relationship between social recovery capital (SRC) and global health outcomes to determine if SRC buffers global health outcomes from the effect of stress.

Study Significance

Outcomes from this study will have far reaching effects influencing theory development, policy, and practice within the field of recovery. The definition of recovery is evolving with most recent iterations suggesting it is a holistic concept describing a process during which change is measured across multiple domains including substance use, physical health, mental health, and well-being. Several researchers have begun looking more broadly at quality of life and health outcomes for individuals on the path to recovery (Smith & Larson 2003; Dennis et al, 2007; Saarni et al., 2008; Schutte, Brennan, & Moos, 2009), but few have sought to develop models to understand how these recovery related global health outcomes change over time or how social aspects of recovery capital shape that change. This study adds to the knowledge base on social recovery capital while also building additional understanding of patterns of recovery across multiple inter-related global health domains.

By utilizing a holistic lens for this analysis and guided by the life course perspective, outcomes from this study will contribute to development of a comprehensive psycho-social theory of recovery. This will also be the first study where recovery capital concepts are examined in relation to global health outcomes of recovery.

The call to redefine recovery is closely intertwined with shifts in policy. The Obama administration has assembled key personnel to establish a recovery agenda and initiate change in how care for addicts is delivered to promote long-term stable recovery. Three key components of the recovery agenda include support for integration of a systems of care structure, financial support for informal and peer based support services (e.g., life coaches, peer educators, etc.), and a call for research focusing on sustained

recovery. One of the key changes underway is that the Substance Abuse Mental Health Service Administration (SAMHSA) is transitioning away from funding formal treatment and toward funding recovery support services directed at enhancing natural forms of recovery capital. By examining the role of recovery capital in the process of recovery, this study will offer evidence for how finances targeting enhancement of recovery capital should be directed.

Systems of care and more precisely recovery-oriented systems of care offer a structure for implementation of chronic care or recovery management interventions for individuals addicted to substances far superior to the structures in place today. However, shifting to a system of care structure requires buy-in from policy makers, providers, and consumers. As systems of care evolve and are integrated into current health care structures, it is critical to understand how different health domains are related. This study seeks to identify recovery pathways bridging these domains. Understanding how they are related will inform how services should be integrated across systems. Another key component of systems of care is that all aspects of care be driven by outcomes. Yet, there is little understanding or agreement as to what outcomes should be evaluated, or how they should inform delivery of care. This study is a step forward by examining recovery outcomes beyond sobriety alone and will inform the outcome evaluation process integral to the success of systems of care.

In the formal treatment arena understanding the relationship between social capital and recovery as a function of stress and use/relapse episodes will influence assessment and intervention practices. Intensity, timing, and targeting of interventions may need to be adjusted based on an individual's configuration of social capital, stress

level, use status, and time. Dennis, Foss & Scott (2007) found that individuals in recovery reported a pattern of worsening mental health for the first three years of their sobriety before experiencing a trajectory shift toward improved mental health suggesting that more intensive mental health interventions over the first 3 years of sobriety might be warranted. By examining trajectories of physical health, mental health, and well-being for individuals in recovery, this study (like that of Dennis and colleagues) will add to the base of knowledge informing how to target and time system-wide interventions to improve recovery outcomes.

Definition of Terms

Definitions of key terms used throughout the study:

1. Recovery – "A process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential" (SAMHSA, 2012). SAMHSA proposed this definition to be used interchangeably to refer to recovery from both mental and substance use disorders. For the purpose of this paper, the term "recovery" and the definition presented here will be used to refer specifically to recovery from addiction to substances.
2. Global Health - The World Health Organization conceptualizes health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948, p. 100). The term "global health" will be used to convey the assumption that health is a multidimensional concept including physical health, mental health, and well-being.

3. Recovery Capital (RC) - Recovery Capital is the extent of internal and external resources one can access and use to both initiate and sustain recovery (White & Kurtz, 2005; Granfield & Cloud, 2001).
4. Social Recovery Capital (SRC) – Social Recovery Capital refers specifically to social resources individuals in recovery can access to initiate and sustain recovery. This study includes three aspects of SRC: general social support, specific support for recovery, and sober network affiliation (the number of individuals in one's social network who are sober).
5. Recovery-Oriented Systems of Care (ROSC) - "A ROSC is a coordinated network of community-based services and supports that is person-centered and builds on the strengths and resilience of individuals, families, and communities to achieve abstinence and improved health, wellness, and quality of life for those with or at risk of alcohol and drug problems." (Partners for Recovery, 2010, pg. 2).

CHAPTER TWO – Literature Review

Theory and Empirical Literature

Life Course Perspective

Framing this study using the life course perspective serves to advance the development of a comprehensive model of recovery that recognizes active addiction and the process of recovery not only overlap but may also be recursive. Recovery is a multidimensional, complex process that is not easily explained or fully understood. The scientific community can affirm an array of factors that place someone at risk for becoming an addict and protective factors that may influence the process of recovery, but to date a comprehensive psycho-social theory of addiction and recovery across the life course is absent from the field. Utilizing the life course perspective to guide the study of addiction and recovery, we can begin to piece together an understanding of common pathways and influence the development of interventions to shift recovery pathways toward improved outcomes.

The life course perspective is a sociological theory that began to take shape in the 1960s in response to glaring gaps that permeated the theory of socialization. Unable to use childhood socialization experiences to fully explain adult developmental pathways, sociologists developed the life course perspective to capture the developmental trajectories of individuals from birth to death (Elder, 1994). The more ecologically influenced lens of the life course perspective offers a dynamic and comprehensive framework for making sense of why individuals do what they do, and how what they do influences the paths they take through life.

The life course perspective suggests that historical and social contexts, an individual's age, and human agency intermingle together to influences the pathways traveled by individuals through time. These pathways are made up of numerous interconnected trajectories that reflect patterns of persistent stability and change (Hser, Longshore, & Anglin, 2007). Transitions or changes occur within the context of trajectories, influencing their form and meaning (Elder, 1994). Not all transitions shape trajectories, but those that produce permanent shifts in individual trajectories are called "Turning Points." No longer is it sufficient to look solely at a person's biology or upbringing as a means to explain why they became an addict or why they are unable to achieve sustained abstinence. Instead, the life course perspective assuming a wider lens of inquiry can be used to better understand the merger between socio-historical contexts and intertwined recovery-related trajectories to uncover pathways through the process of recovery.

Research guided by the life course perspective seeks to identify normative patterns and contextual factors altering those patterns. The life course perspective has proven to be a particularly useful theoretical frame for research across numerous disciplines such as epidemiology, criminology, gerontology, and health care (Lynch & Smith, 2005; Bersani, Neuwbeerta, & Laub, 2009; Yang, 2007; Halfon & Hochstein, 2002).

Substance abuse has been studied looking at time specific use outcomes and more recently utilizing a use and treatment career framework. The use and treatment career framework incorporates longitudinal factors including evolution of use, abuse and dependence, initial treatment, treatment episodes, relapse and abstinence. While the

career framework has offered vital information about the evolution of addiction and treatment, it has only conferred a small degree of insight into the process of recovery and the heterogeneity of recovery pathways. The career framework is also limited by its narrow focus on substance use, overlooking intersecting and overlapping trajectories associated with recovery such as physical health, mental health, and well-being.

In the area of recovery research, increasing attention is being paid to life course trajectories, transitions, and turning points. Furthermore, examination of intertwined trajectories of physical health, mental health, and well-being, in association with social recovery capital and stress can shed light on a more comprehensive picture of the process of recovery. Dennis, Foss, & Scott (2007) utilized the life course perspective to frame their study of abstinence and evaluation of physical health, mental health, and coping as a function of duration of abstinence. They found no significant differences in physical health trends as a function of duration of abstinence, and mental health problems were shown to peak between 1 and 3 years of abstinence. Identification of trends such as these may prove to be integral in influencing how intervention strategies are designed and when care should be delivered to enhance effectiveness.

Identifying unique trajectories of recovery, and examining protective/risk factors that shape those trajectories is critical to developing a more comprehensive understanding of recovery pathways individuals take across the life span. Examining trajectories also allows for identification of subgroups of individuals who follow common pathways which in turn will allow for the development of interventions to facilitate improved outcomes. This study builds on the work of Dennis and colleagues by examining trajectories of health, mental health, and well-being as a function of sobriety, social

contextual influences, stress, indicators of human agency (initiation of treatment and time sober), and socio-demographics.

Comprehensive Theory of Recovery

Historically, recovery from addiction was synonymous with sobriety, and when individuals relapsed, all the gains they had made were erased. With contributions from consumers and the evolution of the Recovery Oriented System of Care (ROSC) Model, increased attention is being paid to re-defining or clarifying the definition of recovery. The push to better define recovery has also received support from providers, policy makers, outcome evaluators, and researchers, all of whom are looking for ways to quantify change and success within the process of recovery. Now that recovery is accepted as a chronic illness often characterized by periods of relapse, using sobriety alone as an indicator of success or health is no longer a viable option.

As a first step toward building consensus on a definition of recovery, The Betty Ford Institute gathered a number of recovery experts to participate on a consensus panel and they were given the responsibility of composing a new definition of recovery. The Betty Ford Institute Consensus Panel defined recovery as "a voluntarily maintained lifestyle characterized by sobriety, personal health, and citizenship" (Belleau, 2007, p. 221). More recently the Substance Abuse Mental Health Service Administration (SAMHSA) sought to develop another working definition of recovery which states that recovery is "a process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential" (del Vecchio, 2012).

Both these working definitions are multidimensional, including aspects of health and well-being, and they overlap significantly with how the World Health Organization (WHO) conceptualizes health. As with efforts to better define recovery, the WHO sought to evolve the concept of health by defining it as, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948, p. 100). Taken together it is clear that the study of recovery must be multi-dimensional and include aspects of mental health, physical health, and well-being.

Physical Health

Abuse of alcohol and drugs have been linked to a large number of chronic and terminal physical illnesses including cardiac disease, HIV, Hepatitis C, and liver disease (Drake, Kaye, McKetin, & Duflou, 2008; Abraham, Degli-Esposti, & Marino, 1999; Hirshfield, et al., 2004; Zucker, 2000). Alcohol alone has been found to be directly linked to 3.8% of global deaths and 4.6% of global disability (Rehm et al., 2009). Although the link between substance abuse and physical health is undeniable, little is understood about the extent of physical damage that can be attributed to addiction. Does the harm caused by substance abuse have long term effects? Does health improve when abuse of substances is terminated or are the effects enduring? How do episodes of relapse affect health over time? Numerous questions remain.

Self-assessed physical health (SAPH) has become a widely recognized indicator of both current and future health status (Mabe & West, 1982; DeSalvo et al., 2005). Meta-analysis of 27 studies examining the validity of self-ratings of health as predictors of mortality concluded that "self-ratings of health, which take only seconds to obtain in a survey interview, reliably predict survival in populations even when known health risk

factors have been accounted for" (Idler et al., 1997, pg 26). Similarly, Ferraro, Farmer, & Wybraniec (1997) using data from a 15 year nationally representative study, found that SAPH was an accurate predictor of both health status and change in health. SAPH measures have also been used across a number of populations in studies examining a broad array of relationships such as gender differences in health, the relationship between domestic partnership and health, and the relationship between race, mental illness and health (Grossman, D'Augelli, & Hershberger, 2000; Whaley, 2010).

Evidence suggests that when research participants anticipate their self-assessments will be validated against some external resource, they are more likely to offer accurate self-assessments (Mabe & West, 1982; Fox & Dinur, 1988). Common methods for validation of self-assessments include corroboration with providers, family members, friends, and biological tests such as urinalysis, blood, or hair analysis.

Using data from the 2006 Gallup World Poll, Deaton (2010) found that self assed physical health (SAPH) declined over time across most countries worldwide. US poll participants showed a steady decline in SAPH over time with a small increase or leveling off occurring around age 50. International comparison of rates of SAPH showed that being wealthy or being from a wealthy country had a protective influence on ratings, and may account for the improved and leveling off around age 50 that was found in the US community sample.

McCullough & Laurenceau (2004) used data from the 59 year long Terman Life Cycle Study of Children with High Ability to examine trajectories of SAPH. They found that SAPH ratings for this highly educated, majority white, middle class sample remained

very stable until age 50 when SAPH ratings began to steadily decline over the remainder of participants lives. Men were found to have better SAPH ratings than women, but experienced much steeper declines as they aged, reporting poorer levels of SAPH than women at 80 years of age. Green, Perrin, & Polen (2004) examined the gender differences in alcohol consumption, physical, and mental health among a large sample of HMO survey respondents. They also found that men reported better SAPH than women.

Marital status has been linked with cancer, heart failure, self-assessed physical health ratings, and mortality rates with those who are married showing improved outcomes across the board (Wang, Wilson, Stewart, & Hollenbeak, 2011; Chung et al., 2009; Lindstrom, 2009; Johnson, Backlund, Sorlie, & Loveless, 2000).

The outcomes discussed here suggest that exposure to advantages afforded as a result of individual gender, education, race affiliation, marital status, and class status may shape trajectories of health over the life course. However, consensus is lacking in relation to the shape of health trajectories over the lifespan, and there is little evidence offering insight into the influence of addiction on physical health over time.

The physical damage caused by a period of active addiction to substances is relentless, with negative effects continuing to inflict physical damage regardless of an individual's ability to sustain sobriety. Schutte, Nichols, Brennan, & Moos (2003) followed older problem drinkers for 10 years and found that mortality rates of former drinkers was 1.6 times those of non-drinkers. Dennis, Foss, & Scott (2007) also looked at physical health outcomes over an eight-year period among individuals in recovery, and concluded that health remained fairly stable, but did not improve in relation to duration of

abstinence. Surprisingly, Grinman et al. (2010) found that drug problems were not associated poorer health status among a sample of homeless men and women in Toronto, Canada. However, aside from the findings of Grinman & colleagues (2010), there is a growing body of evidence suggesting the physical health of individuals in recovery is compromised and that the effects of their addiction on their health is enduring regardless episodes of relapse and/or their ability to sustain sobriety.

Mental Health

The Surgeon General's Report on Mental Health (1999) defines mental health as "a state of successful performance of mental functioning, resulting in productive activities, fulfilling relationships with other people, and the ability to adapt to change and cope with adversity" (pg.4). In any given year about one in five or 20% of individuals in the US are unable to achieve a state of mental health and almost half of all Americans will meet the DSM-IV criteria for mental illness at some point in their lifetime (Kessler et al., 2005). According to the Global Burden of Disease study, in countries with established market economies, mental illness ranks second behind cardiovascular disease in overall burden of disease (Surgeon General Report, 1999). Mortality rates are also highly affected by mental illness, with those suffering from mental illness facing premature death, and living on average 15.4 years less than those who do not suffer from mental illness (Surgeon General Report, 1999). Those particularly vulnerable to the disease include women, minorities, and unmarried individuals (Palner & Mittlemark, 2002; Kessler & Neighbors, 1986; Weaver, Turner, & O'Dell, 2000).

Stress often plays a critical role in the onset and course of mental illness (Hammen, 2005). Stressful life events and cumulative stress have both been found to

intensify or trigger mental illness in individuals, especially those who are vulnerable to the disease (Weaver, Turner, & O'Dell, 2000; Irwin, LaGory, Ritchey, & Fitzpatrick, 2008; Mulina et al., 2008).

Rates of comorbid mental illness for individuals struggling with substance abuse are quite high. Approximately 37% of those addicted to alcohol and 53% of those addicted to other drugs suffer from comorbid mental illness (Regier et al., 1997). Findings from the Epidemiological Catchment Area study estimate 72% of those who access treatment suffer from at least one comorbid mental disorder (Regier et al., 1997). The National comorbidity study estimates that 86% of alcohol dependent women and 78% alcohol dependent men suffer from comorbid mental illness. In community-based samples, comorbidity has been found to be higher among minority groups, individuals with low levels of education, young adults, and individuals who are single (never married, widowed, separated, or divorced) (Compton et al., 2007, Kessler et al., 2005).

The gender distribution of mental illness among those also abusing substances tends to reflect the same rates observed among the general population with more women suffering from affective and anxiety disorders and more men suffering from antisocial personality disorder and ADHD (Diaz et al., 2011; Brady & Randall, 1999). When using general measures of psychological distress or mental health function such as the SCL-90R or SCL-10, differences in comorbidity between men and women tend not to be observed (Sannibale, et al., 2003; Sterling et al., 2004; Nnadi et al., 2002). However among a sample of alcohol and drug addicts participating in a 21-28 day treatment program in Montreal, Canada, women reported poorer mental health functioning than men (Mercier et al., 1992). Additional gender comparisons are needed to clarify if real

differences in general health functioning exist between men and women struggling with substance abuse.

The protective nature of being married on mental health also disappears when individuals struggle with comorbid addiction. Weaver, Turner, & O'Dell (2000) examined depressive symptoms, stress, and coping among women in recovery from drugs and alcohol, and found that higher levels of depression were present among women who were either married or co-habiting. Those who struggle with addiction often are surrounded by others who abuse substances, higher levels of interpersonal violence, and higher levels of stress. As such, it is more likely that marital relationships would be compromised, contributing further to elevated levels of stress and mental distress.

The link between addiction and mental health is undeniable. Evidence suggests that addiction is often a precursor to declines in mental health and that mental health declines are often precursors to the onset of addiction. Substance use or abuse produce changes in the brain that can cause people to experience symptoms of mental illness such as depression and anxiety. Alcohol for example is a well-known depressant affecting those who abuse it both during and after drinking it. Similarly, those who are suffering from mental illness often drink or use substances as a way to cope with stress and the negative emotions associated with their mental illness.

The interrelationship between substance abuse and mental illness raises questions about what happens to an individuals' mental health will they venture down the road of recovery and stop abusing substances. When some people stop abusing substances their mental health symptoms dissipate, but for others their symptoms become more pronounced. For those whose mental illness is derived from biological changes created

by substances, it often takes time for the substances to leave their system before they experience improvements in their mental health functioning. Those who were abusing substances as a means of coping with stress or trauma are likely to see even longer delays before improvements in mental health are experienced. Learning new coping skills and/or addressing the cause of their mental distress in treatment are time consuming and for many a lifelong endeavor.

Dennis, Foss, & Scott (2007) examined the relationship between time sober and several recovery domains, including mental health. They confirmed that mental health did not improve immediately when an individual ceased abuse of substances. Instead they noted that the mental health of recovering addicts only began to improve after three years of sobriety, during which time they experience mental health declines. While Dennis & colleagues offer some evidence that extended episodes of sobriety are needed before the mental health of individuals in recovery improves, no one has looked specifically at how episodes of relapse alter trajectories of mental health over time.

Well-Being

Well-being was introduced as an indicator of quality of life satisfaction by the U.S. Department of Health, Education, and Welfare in 1969 as a way to assess how citizens felt about the course of their lives in the U.S. (Paloutzian & Ellison, 1982). Since that time confusion as to the actual meaning of well-being has evolved as a result of its usage interchangeably with the concept of quality of life. Langlois (2002) suggest that QOL tends to be a unidimensional construct focused on one particular facet such as 'health-related-quality-of-life' whereas well-being more broadly represents an overall sense of how life is across multiple domains. Langlois also suggests that well-being can

be understood to as the "interpretation of quality of life through subjective experience of environmental as well as personal filters" (p. 509). Regardless of the precise definition, it is important to note that researcher have used and continue to use the terms and measures interchangeably. Some of the domains believed to contribute to a sense of well-being include financial and personal security, employment, social relations, community connectedness, physical and mental health, and social justice (NESC, 2009). The comprehensive nature of the construct of well-being suggests it may have a unique place in research as an indicator that crosses disciplines enhancing examination of the interrelated nature of multiple life domains. Given well-being is a concept that is capable of bridging domains and disciplines, it may prove particularly valuable as a relevant indicator of recovery.

Researchers from fields such as medicine, mental health, and social sciences are increasingly turning to general measures of quality of life satisfaction and well-being to measure how people are feeling about their lives (Edmondson et al., 2007; Laudet & White, 2008). Higher levels of well-being have been found to be associated with lower levels of depression, lower stress, higher levels of social support, improved outcomes for cancer patients, and abstinence from substances (Diaz, et al., 2011; Skok, Harvey, & Reddihough, 2006; Kreitler, Peleg, & Ehrenfeld, 2007; Stanton et al., 2012; Donovan et al., 2005).

While research examining factors associated with well-being are many, few have focused on building a better understanding about how well-being changes over time or more specifically how individual and contextual factors differentiate trajectories of well-being over time. With increased emphasis on well-being as an indicator of recovery from

addiction, it is critical that recovery researchers begin to shed light on how factors such as social capital, stress, treatment and use career factors, and socio-demographic characteristics shape or differentiate trajectories well-being over time.

Social Recovery Capital

The life course perspective highlights the relevance of social capital in influencing transitions and turning points that shape trajectories over time. Social capital is the combination of a variety of social elements that if actualized makes it possible to achieve change (Coleman, 1988). Social capital is conceptualized at the micro and macro levels (Nyqvist, Gustavsson, & Gustafson, 2006). Micro level social capital includes social support and social network constructs whereas macro social capital reflects community level characteristics (Putnam, 1993 as cited in Warde, Tampubolon, & Savage, 2005). Evolved from social control theory, Laub & Sampson, 1993 propose that social capital derived from social environments and relationships would inhibit socially deviant behavior and enhance pro-social outcomes. This study builds on this proposition by hypothesizing that micro level social capital factors in the form of support for recovery and sober network affiliation will influence intermingling trajectories (physical health, mental health, and well-being) relevant to the process of recovery.

The study of recovery capital has drawn much attention in the field of addiction and recovery research over the last decade. Recovery is a complex process that is highly influenced by individual and contextual factors as well as the interplay between them. Recovery capital is the term used to describe those factors and is defined as the sum total of one's structural and personal resources that can be brought to bear in an effort to overcome alcohol and drug dependency (Granfield & Cloud, 2001). Evidence suggests

that there are numerous forms of recovery capital (social, cultural, physical, and human) that affect or enhance sobriety outcomes for different people at different stages in the recovery process (Sterling, Slusher, & Weinstein, 2008; Granfield & Cloud, 2001; Humphreys, Moos, & Cohen, 1997; Laudet & White, 2008). Research is needed to better understand what recovery capital factors are most influential across recovery domains and more precisely how they affect the course of recovery over time.

Cloud & Granfield (2004) extended the life course perspective to the field of recovery by studying social and other forms of recovery capital among individuals terminating use of substances. They noted that the decision to cease abuse of substances was a turning point that was frequently influenced by relationships with others, and they concluded that personal transformation was a social product highly influenced by one's social context.

This study will examine the role of two social contextual factors conceptualized as social recovery capital in enhancing global health outcomes for individuals engaged in the process of recovery. Individuals in one's social network who abstain from substances are models for how to live substance-free. They can help to can facilitate linkages to resources that were effective in enhancing their personal success, as well as serve as cultural guides bridging addicts to communities where use and abuse of substances are socially undesirable or unacceptable. Research on wet (users) and dry (abstainers) social network composition have consistently demonstrated that having more non-users in one's network promotes abstinence and conversely having more users in one's network promotes use, abuse, and relapse (Mohr et al, 2001; Zywiak, Longabaugh & Wirtz, 2002; Bond, Kaskutas & Weisner, 2003; Buchanan & Latkin, 2008). Sober network

composition reflects a structural aspect of social integration within social network analysis (Tracy & Biegel, 2008; House, Umberson, & Landis, 1988). Support for recovery is a functional social network component of recovery capital that has also been found to contribute to improved sobriety outcomes (Tracy & Biegel, 2008; Beattie & Longabaugh, 1999; Havassy et al., 1991).

Examination of the relationship between social recovery capital and global health domains of recovery, beyond examination of abstinence alone is limited. Researchers in the health and mental health fields have found that general social support enhances outcomes, but developing an understanding of how recovery-specific support and sober social networks affect global health outcomes is in early stages of development (Nasser & Overholser, 2005; Dennis et al, 2007).

Laudet, Magura, Vogel, & Knight, 2000 have set the stage for future research in this area by examining the influence of support for recovery and sources of support (friend, family, treatment provider, etc.) on sobriety and mental health outcomes among a sample of individuals participating in Double Trouble 12-step groups in NYC. They found evidence that higher levels of support for recovery and having more sources of support were associated with improved mental health and sustained abstinence.

Although there is a substantial body of literature confirming that individuals who abuse alcohol and/or drugs are significantly more likely than non-addicts to suffer from comorbid physical health conditions, research examining the influence of recovery support and sober network effects on physical health outcomes is sparse. Recognizing that rates of comorbid substance abuse and physical diseases are high, Saitz & colleagues (2004) conducted a randomized trial evaluating an intervention designed to link women

who were admitted for inpatient detoxification services with primary health care services. Women who reported higher levels of family support for abstinence were more likely to establish a connection with a primary care physician and receive preventative care. While they did not show a direct effect on physical health outcomes, there is substantial evidence suggesting that primary health care is associated with better health outcomes and reduction in physical and financial costs of delaying and/or pursuing care in emergency room settings (Starfield, Shi, & Macinki, 2005).

Over the last decade, recovery researchers have begun to uncover the role well-being plays in the process of recovery. With that shift in focus has come an interest in understanding how recovery support and sober network factors affect the well-being of individuals recovering from addiction. Beattie & Longabaugh (1997) looked at the role of alcohol and general social components on post treatment drinking and well-being among a sample of adults who participated in a treatment based study in northern California. They found that both abstinence and general support indicators were associated with drinking outcomes, but only general support indicators were associated with well-being. In contrast, Laudet et al. (2000) found that support for recovery was a strong predictor of well-being among a sample of participants engaged in a dual-recovery mutual aid program. Research on recovery support and well-being remains in its infancy with conflicting findings necessitating additional examination to more accurately determine if and how social contextual factors such as support for recovery influences the well-being of those on the path to recovery.

Sober network affiliation may also cross over to influence global health outcomes for those striving to recover from addiction. Social network analysis often utilizes the

size of an individual's community or social network to represent the concepts of social integration and social connectedness (House, Umberson, & Landis, 1988). Berkman & Syme (1979) looked at social integration as a predictor of health and found that those who lacked social integration or connectedness were more likely than those who had a larger network of social relationships to be deceased nine years later. Similarly, Pressman et al. (2005) examined the relationship between social network size and immune response to an influenza vaccination, and concluded that those with smaller social networks were more likely than those with larger social networks to respond poorly to the vaccine. While these studies suggest that the size of person's network alone influences physical health outcomes, evidence that the size of person's social network is associated with mental health or well-being outcomes is absent from the literature.

As discussed previously, having a large sober social network is associated with improved abstinence outcomes. Given the size of a person's social network is associated with their physical health, it is reasonable to think that those with larger sober social networks may also experience better physical health.

Stress

Within the process of recovery, stress has both positive and negative effects. Stress is often cited as a motivating factor for addicts to stop using, initiate treatment, and/or stay sober. Addicts have also reported feeling motivated to change by the stress generated from feeling disconnected from the life they think they should or could be living and how they are living. For many addicts serious health crisis or legal involvement creates sufficient tension to produce a turning point by motivating them to launch a new pathway toward sustained recovery. However, expectations that substances

can alleviate tension when in social situations, help one cope with stress, and/or alleviate pain, even if the effect is temporary, encourages use of substances, propelling many into the dark world of addiction or relapse. Stress reduction, drink to cope and self-medication theories have evolved to explain the role of stress in initiating and maintaining negative addiction trajectories.

Stress that prompted a drug use career is not likely to dissipate just because someone achieves sobriety. While levels of stress have been shown to decrease in relation to duration of abstinence (Laudet, Morgen & White, 2006), for many in recovery and despite sustained abstinence, stress levels remain quite high (Weaver, Turner & O'Dell, 2000). Using baseline qualitative data from the Pathways Study, Laudet, & White (2010) found that time sober did not necessarily equate to an easier life. Even among those with over three years of abstinence, finding, or keeping a job remained a high priority, second only to staying sober. As such, it appears many who sustain sobriety do so despite the prevalence of high levels of stress and ongoing exposure to stressful life events rather in the absence of them.

Research shows that both perceived stress and frequency of actual stressful life events are strongly tied to negative health outcomes. Individuals experiencing high levels of stress are more likely to develop cardiac conditions, diabetes, and obesity (Rod, Gronbaek, Schnohr, Prescott, & Kristensen, 2009; Cadzow & Servoss, 2009). They are also more likely to experience depression, anxiety and post-traumatic stress disorder (Finney, Moos & Mewborn, 1980; Irwin et al, 2008). Evidence suggests that women who experience high rates of stressful life events are more likely to be at risk for breast cancer and that HIV positive men exposed to high rates of stress are more likely to

experience faster progression of the disease. Well-being is also compromised in the face of stress with particular groups, such as mothers caring for disabled children, demonstrating heightened levels of vulnerability to the effects of stress (Skok, Harvey, & Reddihough, 2006; Taylor & Aspinwall, 1996). While much work remains to be done in order to understand the mechanism of action that stress takes to influence health outcomes, the link is undeniable.

Stress Buffer and Direct Effects Models

Social relationships have an influential role with physical health, mental health, and well-being. In 2000, Laudet et al. examined the role of social support among individuals participating in Double Trouble Recovery, a 12-step based program for individuals suffering from dual diagnosis (addiction and mental illness). They found that those with higher levels of social support used substances less, experienced less mental distress, and reported higher levels of well-being. Among a sample of adults receiving free care at urban clinics, low levels of social support were associated with higher rates of obesity, cardiac disease and depression (Cadzow & Servoss, 2009). In a study looking at the role of social support in recovery from surgery, Kulik & Mahler (1989) found that patients who underwent coronary-bypass surgery and received higher levels of social support after surgery took less pain medication and recovered more quickly than patients who lacked social support.

Two models have evolved to explain the mechanism through which social support affects health outcomes: the direct effect model, and the stress buffering model. The direct effect model posits that social relations are beneficial during both stressful and non-stressful times whereas the buffering hypothesis suggests social relations only matter

during stressful times when they function to ameliorate the negative effects of stress (Cohen & Wills, 1985; Taylor & Aspinwall, 1996; Kawachi & Berkman, 2001).

Using similar social support and network variables as those used in this study, Iso-Ahola & Park (1996) sought to learn whether friendship (general social support) and companionship (number of individuals in one's leisure social network) directly influenced the health and mental health of individuals engaged in a martial arts program, or if the influence of these social factors was indirect by buffering stress. Both support and social network variables were directly predictive of self-assessed physical health, depression and physical problems. The size of a person's social network was found to buffer the effects of stress on depression and social support from friends buffered the effects of stress on actual physical health problems. This study suggests structural network variables such as the size of a person's social network may play a role in buffering the effects of stress on mental health, while both social network characteristics and social support directly influence physical health self-ratings. This study also draws attention to the fact that how social capital and health outcomes are operationalized may play a major role in making sense of the relationship between social capital, stress, and global health outcomes.

Cohen & Wills (1985) using meta-analysis sought to clarify the relationship between social relations and well-being. They concluded that social network affiliation directly influenced well-being, while general social support affected well-being by buffering the negative effects of stress. When social support is operationalized in terms of social network association, the direct effect model offers the best explanation for mechanism of action. However, when social support is operationalized in terms of

quality of support or perceived social support it is likely that the buffering model more accurately explains how social support influences well-being.

Laudet et al. (2006) utilized baseline data from the pathways study to determine if recovery capital more generally functioned to buffer the negative effects of stress on quality of life. They operationalized recovery capital as social support, support for recovery, spirituality, life meaning, religiousness, 12-step attendance, and 12-step affiliation. While not all dimensions of recovery capital tested remained in the final model, findings supported recovery capital buffered stress and enhanced quality of life outcomes.

Research is needed to identify specific dimensions of social recovery capital that maintain or alter global health trajectories either directly or via a stress buffering model. Developing a better understanding of the mechanisms through which social capital affects global health for individuals in recovery will allow for targeting of interventions to enhance recovery outcomes. Figure 1 below depicts both the direct and buffering models tested in this study.

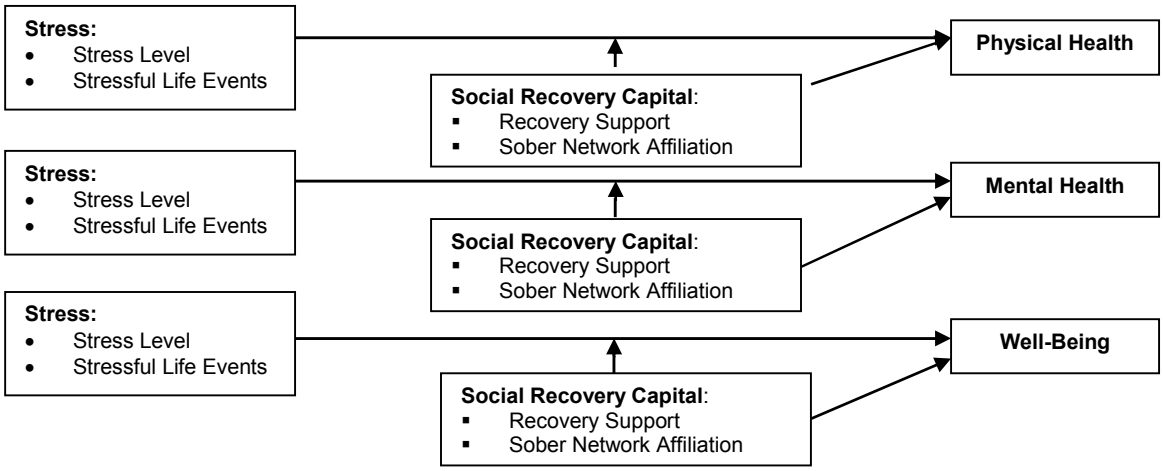


Figure 1. Direct and Stress Buffering Models

Dissertation Questions and Hypothesis

Analysis will be guided by the following research questions and hypotheses:

Q1. For individuals recovering from addiction, how do the global health indicators of physical health, mental health, and well-being change over time?

H1: Self-assessed physical health (SAPH) will decline over time.

H2: Mental health will improve over time, but only after an initial decline.

H3: Well-being will improve over time.

Q2. Do socio-demographic characteristics differentiate global health trajectories?

Self-assessed Physical Health (age, gender, marital status, education, race)

H4: As individuals get older, their levels of SAPH will decline.

H5: Men will have higher levels of SAPH than women.

H6: Married individuals will have higher SAPH ratings than those who are unmarried.

H7: Those with higher levels of education will have higher levels of SAPH than those with lower levels of education.

H8: Minority (non-White) individuals will have lower SAPH ratings than whites.

Mental Health (age, gender, marital status, education, race)

H9: As individuals age, their mental health will decline.

H10: Women will have poorer ratings of mental health than men.

H11: Married individuals will have better mental health ratings than those who are unmarried.

H12: Those with a high school degree or higher level of education will have better mental health ratings those who left high school before graduating.

H13: Individuals reporting minority status affiliation will have poorer mental health ratings than whites.

Well-Being (age, gender, marital status, education, race)

H14: Well-being will not vary in relation to age.

H15: Well-being will not vary in relation to gender.

H16: Well-being will not vary in relation marital status.

H17: Those with higher levels of education will have higher levels of well-being than those with lower levels of education.

H18: Minority (non-White) individuals will have lower levels of well-being than whites.

Q3. Do substance use and career factors influence global health trajectories?

Self-assessed Physical Health (time sober, treatment ever, severity)

H19: SAPH ratings will not vary in relation to time sober.

H20: Trajectories of SAPH will not be different for those who previously participated in substance abuse treatment in comparison to those who have not.

H21: Those with higher addiction severity at baseline will have poorer SAPH

Mental Health (time sober, treatment ever, severity)

H22: Time sober will be positively associated with mental health ratings over time with those who have more than one year sober at baseline reporting higher levels of mental health than those with less than one year sober at baseline.

H23: Trajectories of mental health will not be differentiated in relation to those who have or have not previously participated in substance abuse treatment in comparison to those who have not.

H24: Those with higher addiction severity at baseline will have poorer mental health than those with lower addiction severity at baseline.

Well-Being (time sober, treatment ever, severity)

H25: Those with more time sober at baseline will have higher levels of well-being than those with less than a year sober at baseline.

H26: Trajectories of well-being will not be differentiated in relation to those who have or have not previously participated in substance abuse treatment.

H27: Those with higher addiction severity at baseline will have lower levels of well-being.

Q4. How does relapse shape global health trajectories?

H28: Return to abuse of substances in the past year (relapse) will have a negative effect on trajectories of SAPH

H29: Return to abuse of substances in the past year (relapse) will have a negative effect on trajectories of mental health functioning.

H30: Return to abuse of substances (relapse) in the past year will have a negative effect on trajectories of well-being.

Q5. How does social recovery capital influence global health trajectories (physical health, mental health, and well-being) for individuals on the path to recovery

Self-assessed Physical Health

H31: Higher levels of perceived support for recovery will be associated with better ratings of SAPH.

H32: Larger social network affiliation size will be associated with better SAPH.

Mental Health

H33: Higher levels of perceived support for recovery will be associated with better mental health ratings.

H34: Larger social network affiliation size will be associated with better mental health ratings.

Well-Being

H35: Higher levels of perceived support for recovery will be associated with better well-being.

H36: Larger social network affiliation size will be associated with better well-being.

Q6. Does stress negatively influence global health trajectories?

Self-assessed Physical Health (past year stress level & number of stressful life events)

H37: Higher levels of stress will be associated with poorer SAPH.

H38: As number of stressful life events increase SAPH ratings will decline.

Mental Health (past year stress level & number of stressful life events)

H39: Higher levels of stress will be associated with poorer mental health.

H40: As number of stressful life events increase mental health will decline.

Well-Being (past year stress level & number of stressful life events)

H41: Higher levels of stress will be associated with poorer well-being.

H42: As number of stressful life events increase, well-being will decline.

Q7. Does social recovery capital buffer the negative effects of stress on global health outcomes for individuals on the path to recovery?

Self-assessed Physical Health:

H43: Perceived support for recovery will *directly* influence SAPH.

H44: Sober social network affiliation size will *directly* influence SAPH.

Mental Health:

H45: Perceived support for recovery will *buffer* the negative effects of stress on mental health ratings.

H46: Sober social network affiliation size will *directly* influence mental health ratings.

Well-Being

H47: Perceived support for recovery will *buffer* the negative effects of stress on well-being.

H48: Sober social network affiliation size will *directly* influence well-being.

CHAPTER THREE – Methodology

Study Design and Sampling Strategy

This study employs a longitudinal design utilizing secondary data from the Pathways to Long Term Abstinence Study to delineate the role of individual characteristics, stress, and social recovery capital factors in shaping global health trajectories for individuals at different phases of recovery. The Pathways study utilized a community-based naturalistic sample design with highly structured and manualized computer-assisted interview procedures. Saliva sampling was used to corroborate self-reports of substance abstinence.

Longitudinal design offers benefits over cross sectional design by providing a more accurate depiction of change and trends over time. However, longitudinal studies often struggle with high attrition rates. Attrition rates in the Pathways Study were minimized by utilization of an extensive tracking system and incrementally increasing rewards in the way of gift cards for ongoing participation. Utilization of such strategies resulted in an 83% retention rate over the course of the study and full dataset N=355.

The Pathways study was funded by NIDA grant *R01 DA014409*-04. Participants were recruited via media advertisements and posted solicitations throughout New York City beginning in 2003. Media recruitment consisted of utilizing newspaper advertisements and flyers posted throughout New York City. Individuals who responded to the ads were screened for eligibility. Of those who were recruited, 702 individuals were screened, 440 were found eligible, and 355 were enrolled in the study. Media recruitment is understood to be a sufficient strategy for recruitment of community based non-treatment samples (Rumpf, Mischof, Hapke, Meyer, & John, 2000). To be eligible

for the study, individuals needed to 1) Report at minimum one month of sobriety; 2) Have met the DSM-IV(TR) criteria for abuse or dependence for at least one year within their lifetime; and 3) Not be enrolled in residential treatment. When the target sample size was attained, screening interviews were closed. Informed consent was reviewed and obtained during the baseline interview, and participants were compensated with a $30 gift card. Each quarter, individuals were contacted to review and update locator info and were sent $5 gift cards for completing the locator confirmation calls. Individuals were also rewarded by being entered into monthly drawings for a $50 gift card when they contacted interviewers to schedule follow up interviews within one month of receipt of the scheduling reminder letter. Incentives for each subsequent follow up interview increased incrementally with individuals receiving $40 year 1, $50 year 2 and $70 year three.

Measurement

Global health is the goal of recovery from addiction and encompasses such domains as physical, emotional, relational/social, ontological, and occupational health (White & Kurtz, 2005). For the purpose of this study, outcome domains of global health under analysis will include physical health, mental health, and well-being.

Global Health Outcomes

Physical Health. Physical health is measured using a single self-report question asking participants on a 5 point scale (excellent=1 to poor=5), "Overall, how would you describe your physical health right now?" This variable was reverse coded (1=poor to 5=excellent) such that all dependent variables would have higher values reflecting higher levels of health and lower values indicating poorer health. Studies have confirmed strong

associations between self-reported physical health status, physician health assessments, disease, and mortality (Goldstein, Siegel, & Boyder, 1984; Mabe & West, 1982; DeSalvo et al., 2005; Wilson et al., 2007). Similar physical health measures such as the one used here have also been used in studies examining gender differences in health, the relationship between domestic partnership and health, and the relationship between race, mental illness, and health (Grossman, D'Augelli, & Hershberger, 2000; Whaley, 2010).

Mental Health. The Symptom Checklist-10R (SCL-10R) as a measure of mental distress, and when reversed is an indicator of Mental Health. The SCL-10R is a brief version of the SCL-90 that was designed and originally validated by Rosen & colleagues, 2000. The SCL-10R has been shown to have good internal consistency with Cronbach's $\alpha = .88$ (Rosen et al., 2000). There are 10 items assessed by the SCL-10R each of which is measured on a 5-point Likert scale (0=not at all to 5=extremely) with higher score reflective of higher mental distress and lower scores reflective of lower levels of distress. The scale was reverse coded in order to have higher values represent mental health and lower values indicating mental distress (0=extremely to 5= not at all). Mean scores generated from the sum of all 10 items was used for analysis in this study (Wave 1 $M = 3.36$, SD = .63). The SCL-10R has been used as a measure of mental health or distress in studies examining effectiveness of medications to treat OCD, coping among female incest survivors and as a mental health screening tool for primary care physicians (Brand & Alexander, 2003; Kopenen et al., 1997; Cano et al., 2001).

Well-Being. The Existential subscale of the Spiritual Well-Being Scale (SWBS) measures an individual's meaning and purpose in life (Paloutzian & Ellison, 1982). For the purpose of this study, the existential subscale was used to reflect general well-being.

The Existential subscale of the SWBS consists of 6 items rated on a 6 point Likert-type scale with higher scores indicating greater well-being; sample item: "I believe there is some real purpose for my life." Negatively phrased items were reversed, and the score used is a mean score generated from the sum of the 6 items (Wave 1 $M = 2.98$, SD = .38). Cronbach's α for existential subscale of the SWBS = .87 (Laudet & White, 2008). In Laudet & White, 2008, well-being as measured by the existential subscale of the SWBS at baseline predicted recovery at one year follow up.

Social Recover Capital

Recovery capital is a broad construct referring to individual and contextual factors in one's life that enhance their ability to recovery from drugs and alcohol. This study focuses on the social dimension of recovery capital. Social recovery capital is a merger of the concept of social capital, which is integral to the life course perspective, and recovery capital, which is an underlying construct in the development of a psycho-social theory of addiction and recovery. For the purpose of this study, *Social Recovery Capital* is operationalized to include sober network affiliation, support for recovery, and general social support.

Sober Network Affiliation. Sober network affiliation in this study reflects the number of sober individuals in participants' immediate social networks. Aspects of sober network composition or affiliation such as the percentage or number of substance users, individuals who are sober, and individuals encouraging alcohol or substance reduction in one's social network are associated with positive alcohol and other drug outcomes (Zywiak et al., 2002; Bond et al., 2003; Mohr et al., 2001).

Recovery Support. Recovery Support is measured using The Social Support for Recovery Scale (SSRS) which consists of 11 items measured on a 4 point Likert scale (1=strongly disagree to 4 =strongly agree). Negatively phrased questions are reverse coded and mean scores calculated for use in this study (Wave 1 $M = 3.02$, SD = .39). Good internal consistency is observed with Cronbach's $\alpha = .88$ (Laudet, 2000).

General Social Support. The Social Support Appraisal Scale is a 23 item instrument utilizing a 4 point Likert scale (1=strongly disagree to 4= strongly agree) to measure perception of esteem social support (Vaux & Harrison, 1985). Negative items are reverse coded and mean scores are calculated from all 23 items (Wave 1 $M = 2.99$, SD = .35). Higher values indicate higher levels of perceived support. Internal consistency as measured by Cronbach's $\alpha = .92$ for the total 23 item measure.

Stress

Stress is measured in two ways intended to capture both an individual's subjective appraisal of their level of stress and an inventory of stressful life events that are believed to be associated with stress.

Stress Level. Stress Level is measured using a single self-report question asking participants on an 11 point scale (0=not at all to 10=extremely), "Overall, how stressed have you been in the past year?" Stress operationalized in this manner has been used in two other studies utilizing data from the Pathways Study, looking at the role of social supports, religiousness, life meaning and 12 step affiliation in quality of life satisfaction, and the other looking at recovery capital as a predictor of sustained sobriety, life satisfaction and stress (Laudet et al., 2006; Laudet & White, 2008).

Stressful Life Events. The 11 item Stressful Life Events instrument developed by Alexandre Laudet and used in the Pathways Study assesses a variety of personal, occupational, legal, relational, criminal, and financial domains. Participants were asked to indicate if any of the 11 events had happened to them in the previous year. Example items include: "death of a loved one", "personal injury or illness," and "change in living conditions." Analysis uses a sum score with higher values indicating accumulation of more stressful life events and lower values indicating fewer occurrences of stressful life events over the previous year.

Sobriety Status

In order to be included in the Pathways Study, all participants were required to be sober at baseline. At each subsequent follow up interview, participants were asked if they had used alcohol and/or an array of other substances since the last interview. If they responded yes to any of those questions, their sobriety status for that interview was coded as 0 and if they had sustained abstinence during that follow up period, their sobriety status was coded as 1. Sobriety status was included in analysis as a level-1 time varying predictor.

Socio-Demographics

Socio-demographics. Socio-demographic variables included in this study were gender (1=female; 0=male), marital status(1=married; 0=unmarried), minority status (1=white; 0=non-white minority), education(1=high school dropout; 0=high school graduate or more), and age (continuous variable).

Substance Use and Treatment History Covariates

Additional covariates to be examined included include time sober at baseline (1=under 1 year; 0=over 1 year), treatment ever (1=treatment at some point; 0=never participated in treatment), and addiction severity. Addiction severity was measured using the Lifetime Non-alcohol Psychoactive Substance Use Disorder subscale of the Mini International Neuropsychiatric Interview (M.I.N.I). This subscale contains 14 items answered in a yes or no format. Each response is scored as 0=no and 1=yes. Total scores range from 0-14 (M =11.65, SD = 2.40) with higher scores indicating higher levels of dependence severity. The M.I.N.I. is widely used, and has been validated against other instruments (Sheehan et al., 1998; Lecrubier, et al., 1997). Cronbach's alpha for this sample=.81 (Laudet, 2007).

Statistical Analysis

Univariate descriptive analysis, graphs, bivariate correlations, and normality testing were carried out with baseline data using SPSS version 18 (Norusis, 2004). Outcomes from univariate and bivariate analysis are presented in Tables 1, 2 and 3. Univariate normality analysis was conducted to guide data transformations and preparation of the data for transition to the format necessary to conduct advanced statistical procedures using HLM. Transformations of continuous variables failed to produce normal distributions. Robust standard errors were used during HLM analysis to offset the influence of non-normality in the data (Maas & Hox, 2004)

Multicolinearity or correlations between independent variables at .70 or higher can have significant influence on regression outcomes (Berry & Feldman, 1985) and make it very difficult to differentiate the independent effects of variables (Vogt, 2005). General

social support and recovery support correlated at .78. While they measure different aspects of social support, both theoretically are understood to contribute to social recovery capital. Because there is more known about the relationship between general social support and global health outcomes than between support for recovery and global health outcomes, the decision was made to remove general social support from subsequent analysis and the variable representing support for recovery was retained in the model.

Missing Data

While missing data is often the norm in longitudinal studies, in the current analysis missing data was negligible with no time-variant variable having more than 1.8% missingness. Missing level-2 data were excluded when the HLM file was generated (N=353). However because HLM only requires one time point to be available in order to generate slope estimates allowing for all available data to be retained and utilized in analysis (N=1213). Because there was so little missing data, the elimination of a small number of cases is not likely to have a large impact on the results generated from this analysis.

Latent Growth Curve Modeling

Latent growth curve (LGC) analysis is a multilevel modeling methodology ideal for examining intrapersonal (within person) and interpersonal (between persons) change over time (Preacher, Wichman, MacCallum, & Briggs, 2008). LGC analysis was carried out utilizing Hierarchical Linear Modeling (HLM) Version 7. This multilevel modeling approach to LGC analysis allowed for the examination of the structures, trajectories, and predictors of change in physical health, mental health and well-being over time

(Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2011). Multilevel modeling is applicable to longitudinal data with when the goal is to model trajectories and predictors over time (Luke, 2004)

There are several benefits of HLM over other analytical methodologies such as OLS regression, MANOVA, and SEM (Singer & Willett, 2003; Luke, 2004). Multilevel modeling is easily adapted to longitudinal analysis where individual data is nested within time. In longitudinal analysis missing data and attrition are often inevitable. Because HLM is able to utilize all available data and model trajectories based on the missing at random assumption, it is both flexible and robust when data is missing (Sirin, Ryce, Gupta, & Rogers-Sirin, 2012). HLM allows for the modeling of both fixed and random effects with fixed effects representing the average trajectory of the larger sample and random effects depicting individual variation occurring around the mean trajectory. Also valuable is HLM's ability to assess the nature of change across time by modeling linear and quadratic trajectories. The present study has four repeated observations meeting HLM LGC modeling minimum requirement of three repeated observations (Bollen & Curran, 2006).

Variables representing mental health and well-being are both continuous variables. However, physical health is ordinal with five categorical categories. Many researchers choose to use continuous analysis for ordinal dependent variables. While the analysis is slightly different, the model fit procedures are virtually identical. However, when conducting HLM with ordinal dependent variables, it is not possible to conduct hypothesis testing for model fit. Given that many researchers choose to model ordinal dependent variables with five categories as continuous in HLM, both ordinal and

continuous modeling procedures were carried out with virtually identical final models produced. For ease of interpretation and comparison among models for the three dependent variables, analysis of models for physical health will be carried out utilizing procedures for continuous variables.

Analysis was conducted utilizing full maximum likelihood (FML) estimation methods, and all continuous predictor variables with the exception of interaction effects and dummy coded variables were grand mean centered. Differences between FML and restricted maximum likelihood (REML) tend to be minimal when the level-2 N is greater than 30, with FML offering benefits over REML. Full maximum likelihood estimation is preferred over other estimation methods because the deviance statistic produced by FML can be used to assess model fit comparing both fixed and random components (Luke, 2004).

Examination of individual global health trajectories allows for evaluation of the influence of social recovery capital and stress in shaping those trajectories. Because of their possible confounding effects, socio-demographic characteristics, substance use and treatment factors are included in analysis as time-invariant covariates.

The process used to fit and trim models followed procedures outlined by Singer and Willett, 2003. Analysis evolved from a simple unconditional means models to more complex conditional models incorporating time variant (Level-1) and time invariant variables (Level-2). Model development for each dependent variable (physical health, mental health, and well-being) was guided by theory, hypothesis testing, and comparison of model fit. Decisions about which variables were to remain in the analysis were made based on significance levels of fixed effects and hypothesis testing. Analysis was

conducted incrementally and variables where both coefficients and corresponding random effects were not significant were excluded from future models. Random effects that were found to be significant were allowed to vary and those that were not significant were fixed.

The multilevel analysis process began with running Unconditional Means Model (Figure 2) for each global health outcome variable in order to determine if there was sufficient between-person variance to justify use of HLM. The *intra-class correlation coefficient (ICC), p*, represents the proportion of variance due to level-2 time invariant individual characteristics, and is calculated as $p=\tau_{00}/(\sigma^2+\tau_{00})$. ICC values for each dependent variable (Physical Health (p= .34), Mental Health (p=.35), and Well-Being (p=.43)) indicate substantial amounts of both within and between person variance remains to be explained. ICC scores are often used to assess appropriateness for utilization of HLM statistical methods. While there is no agreed upon ICC cut point value identified for making such determination, it is generally accepted that use of HLM is not necessary when ICC values are very low (Woltman, et al., 2012). With moderate ICC levels ranging from .34 to .43, there is sufficient evidence justifying use of HLM.

Once it was determined that there was sufficient level-2 variation to justify use of HLM, an unconditional growth model was examined for each dependent variable. Wave was coded as 0, 1, 2, and 3 to reflect the four time points when data was collected and is the only predictor included in the unconditional linear model. Examination of fixed effects allows us to test the hypothesis that the intercept (π_{0i}) and slope (π_{1i}) of the trajectory are not 0. Next I looked to see if the variance component attributed to Wave was significant. Significance of the variance component indicates that there is inter-

individual variability in the trajectories across time. I also examined the level-1 variance component (σ^2) and level-2 variance component (π_{00}) to confirm introduction of predictor variables was substantiated.

Once the linear growth model (Figure 2) was confirmed as demonstrating improved model fit in comparison to the unconditional means model, the quadratic term WaveSq was entered into the model. The decision whether to move forward in testing an unconditional quadratic model (Figure 2) is made based on a comparison of the unconditional growth model with the unconditional means model. For each dependent variable, the unconditional quadratic growth model was examined and compared to its unconditional linear growth model counterpart to determine if the growth curve would be best represented by a curve or a straight line. Hypothesis testing was utilized to determine whether the quadratic model offered significant improvement over the linear model.

Model	*Level-1 Model*	*Level-2 Model*	*Mixed Model*
Means Model (null)	$Y_{ti} = \pi_{0i} + e_{ti}$	$\pi_{0i} = \beta_{00} + r_{0i}$	$Y_{ti} = \beta_{00} + r_{0i} + e_{ti}$
Linear Growth Model	$Y_{ti} = \pi_{0i} + \pi_{1i}(Wave)_{ti} + e_{ti}$	$\pi_{0i} = \beta_{00} + r_{0i}$ $\pi_{1i} = \beta_{10} + r_{1i}$	$Y_{ti} = \beta_{00} + \beta_{10}Wave_{ti} + r_{0i} + r_{1i}Wave_{ti} + e_{ti}$
Quadratic Growth Model	$Y_{ti} = \pi_{0i} + \pi_{1i}(Wave)_{ti} + \pi_{2i}(WavSq)_{ti} + e_{ti}$	$\pi_{0i} = \beta_{00} + r_{0i}$ $\pi_{1i} = \beta_{10} + r_{1i}$ $\pi_{2i} = \beta_{20} + r_{2i}$	$Y_{ti} = \beta_{00} + \beta_{10}Wave_{ti} + \beta_{20}WaveSq_{ti} + r_{0i} + r_{1i}Wave_{ti} + r_{1i}WaveSq_{ti} + e_{ti}$

Term	Description
Y	Dependent Variable
t	Time (wave)
i	Individual
π	Level-1 coefficient
π_{0i}	Intercept – Initial dependent variable score for each individual (i)
π_{1i}	Slope – Velocity/Linear rate of change (direction and magnitude) for each individual (i)
π_{2i}	Slope – Acceleration/Non-linear rate of change over time (quadratic growth) for each individual (i)
e	Level-1 random effects
β	Level-2 coefficients
r	Level-2 random effects

Figure 2. Unconditional Multilevel Models

Using either the linear or quadratic growth model that best fit the data, model development advanced to testing a conditional model for each dependent variable that incorporated level-1 time variant social recovery capital variables. As mentioned previously, due to collinearity concerns the variable representing general social support was eliminated from the analysis. Recovery support and sober network affiliation variables were both entered into models grand centered to avoid collinearity issues in subsequent analyses with interaction terms (Hofman & Gavin, 1998). Sobriety status was then added at level-1 indicating at each wave if a person was sober or if they had relapsed. Integration of sobriety into the model allowed me to test the relationship between sobriety and global health outcomes while also controlling for changes in

sobriety status as I examine the other main effects of social recovery capital. Utilizing the same process discussed above, level-2 variant variables representing stress and interaction effects between each stress indicator and each social recovery capital indicator were entered into the model. Model improvement was assessed using chi-square hypothesis testing and predictors that were not significant at ($p<.05$) were trimmed from fixed and random effects.

Finally, a cross-level interaction model was examined to evaluate the interaction between level-2 time variant covariates and level-1 variant predictors. To determine the variance attributed (r^2) to the final level-1 model that includes all the level-1 time variant predictors described above, the following equation was used: $r^2 = (\sigma^2_{\text{null}} - \sigma^2_{\text{final level-1 model}}) /+ \sigma^2_{\text{null}}$ (Woltman, Feldstain, MacKay, & Rocchi, 2012).

Socio-demographic indicators included in analysis include gender, marital status, minority status, education level, and age. Substance use and treatment history variables included in the model include severity of addiction, participation in substance abuse treatment ever in one's lifetime and time sober at baseline. This model offers insight into if and how socio demographic characteristics interact with social recovery capital to influence physical health, mental health, and well-being outcomes over time. To determine the variance explained by inclusion of the level-2 time invariant predictors, the following equation was used: $r^2 = (\tau^2_{\text{null}} - \tau^2_{\text{final level-2 model}}) /+ \tau^2_{\text{null}}$ (Woltman, et al., 2012).

After final models for each of the 3 dependent variables were confirmed, level-1 and level-2 residual files for each final model were generated for the purpose of examining assumptions of functional form (linearity), normality, and homoscedasticity. Using HLM, individual change trajectories for each dependent variable tested were also

generated for a small sample. These trajectories were examined individually and overlaid to determine presence of a linear or quadratic pattern. All other assumption analysis was conducted using SPSS. Level-1 linearity was evaluated by first generating scatter plots of all independent variables with corresponding dependent variables in each model. Level-1 residuals should have a mean of zero and be normally distributed. Normality was confirmed via visual examination of histograms and QQ plots of level-1 residuals. It is also assumed that there is constant variance (homoscedasticity) in level-1 residuals across all values of the dependent variables. Homoscedasticity was evaluated by visually examining the scatter plots of fitted values and level-1-residuals, and scatter plots of level-1 residuals and each predictor variable.

Level-2 assumption of normality was tested by creating a scatter plot of the Mahalanobis distance, the distance between residual estimates for each group relative to the expected distance, and chipct, which is the "expected values of the order statistics for a sample of size j selected from a population that is distributed $\chi^2_{(v)}$" (Raudenbush et al., 2011 p. 40). When values cluster along a 45% angle line the assumption of normality is confirmed. Homoscedasticity and linearity of level-2 was evaluated by examining scatter plots of level-2 residuals against level-2 continuous predictors present in the final model. Symmetry of variance in the vertical direction (above and below 0), indicate assumptions of homoscedasticity and linearity were confirmed. There was sufficient evidence confirming appropriate assumptions were met for all final models.

CHAPTER FOUR – Findings

Demographics and Bivariate Relationships

The majority of participants in this study were male (55.8%), non-white (Black, Latino or Other race) (84.5%), and unmarried (56.3%). Participants ranged in age from 21 to 65 years (M = 43.59, SD = 7.96). The education level of participants was highly variable with 41% having dropped out of school before graduating from high school and 38% attending college. Just over half (55.2%) of the sample reported having sustained abstinence for one year or more at baseline. Participants demonstrated long and serious substance use histories with mean use careers lasting 18.7 years (SD = 12.0) and high levels of addiction severity (M = 11.7, SD = 2.4). The majority of participants (87%) reported engaging in some form or substance abuse treatment in their lifetime. Of those who participated in treatment, fewer than 25% entered treatment before 25 years of age. While participating in the study, 55% of participants were able to remain sober. Of those who relapsed, 17.5% did so at least once per year and 27.6% did so less frequently, reporting relapses 1-2 times over the 4 years.

Table 1

Individual Time Invariant Variables (N=355)

	N	***%***	***Range***	***Mean***	***SD***
Ethnicity					
White	55	15.5%			
Non-White Minorities	300	84.5%			
Education					
High school drop out	145	40.8%			
High school graduate	210	59.2%			
Marital Status					
Married	155	43.7%			
Unmarried	200	56.3%			
Gender					
Male	198	55.8%			
Female	157	44.2%			
Time sober at baseline					
Less than 1 year continuous abstinence	159	44.8%			
More than 1 year continuous abstinence	196	55.2%			
Use and Recovery Career					
Participated in substance abuse treatment	309	87.0%			
Never participated in substance abuse treatment	46	13.0%			
Age			21-65	43	8.07
Addiction Severity			0-14	11.65	2.40

Visual examination of distributions and statistical evaluation of skew and kurtosis statistics were conducted to assess normality for all continuous variables. While the distribution of most continuous variables appeared normally distributed or approaching a normal distribution, variables representing severity of addiction (negative skew/positive kurtosis), stressful life events (positive skew/negative kurtosis), sober network affiliation(positive skew/positive kurtosis), and mental health (negative skew/positive kurtosis) suggested deviance from a normal distribution. Attempts to improve normality utilizing square root, natural log and log 10 transformations failed. As such analysis was conducted utilizing untransformed variables. Because HLM is robust in the face of non-normal distributions, it was an appropriate analysis choice for this study.

Examination of Bivariate correlations between time variant predictor variables and variables representing global health domains of recovery indicated that social recovery capital and stress variable associations with outcome domains were inconsistent (Table 2). The larger an individual's sober network and the more general social support individuals had, the better their physical health. In contrast, recovery support, stress level, and stressful life events lacked any association with physical health. The more social and recovery support an individual reported, the better their mental health. The size of an individual's sober network had no relationship with their mental health. Both stress level and stressful life events negatively and significantly influenced the mental health of individuals in recovery. Well-being like mental health was not associated with the size of individual's sober network, but was significantly and positively influenced by the amount of general and recovery support reported. While stress level was significantly and negatively associated with individual well-being, the number of stressful life events

was not, indicating that perceived stress may be more influential than actual stressors experienced.

Table 2

Wave 1 Outcome and Time Variant Predictor Variables: Correlations and Descriptive Statistics (N=355)

	1	2	3	4	5	6	7	8
Dependent variables								
1. Physical health	1.0	.22**	.15**	-.10	.03	.07	.12*	.12*
2. Mental health		1.0	.26**	-.37**	-.18**	.13*	.19**	.04
3. Well-being			1.0	-.27**	-.04	.56**	.58**	.08
Time invariant predictor variables								
4. Stress level				1.0	.30**	-.19**	-.23**	-.08
5. Stressful life events					1.0	-.07	-.07	.08
6. Recovery Support						1.0	.78**	.09
7. General Social Support							1.0	.08
8. Sober network affiliation								1.0

	1	2	3	4	5	6	7	8
Mean	3.14	3.36	2.98	6.25	3.88	3.02	2.99	5.52
SD	0.92	0.63	0.38	2.57	2.14	0.39	0.35	10.17
Range	1-5	.80-4	1.67-4	1-10	0-11	1.78-4	1.90-4	0-81

*p < .05; **p < .01; ***p < .001; all correlations are two-tailed

Table 3

Outcome and Time In-Variant Predictor Variables: Descriptive Statistics

	Physical Health			Mental Health			Well-Being		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Full Sample									
Wave 1	355	3.14	.92	355	3.36	.63	355	2.98	.38
Wave 2	309	3.03	.86	315	3.40	.60	312	2.96	.37
Wave 3	299	3.0	.77	299	3.55	.64	299	3.02	.41
Wave 4	284	2.98	.81	284	3.57	.61	284	3.08	.41
Women									
Wave 1	157	3.14	0.92	157	3.32	0.66	157	2.99	0.40
Wave 2	139	2.87	0.85	142	3.40	0.65	140	2.98	0.36
Wave 3	135	2.93	0.74	135	3.46	0.69	135	3.02	0.45
Wave 4	126	2.83	0.77	126	3.46	0.71	126	3.03	0.41
Men									
Wave 1	198	3.19	0.94	198	3.40	0.60	198	2.97	0.38
Wave 2	170	3.15	0.84	173	3.40	0.57	172	2.94	0.37
Wave 3	164	3.05	0.80	164	3.62	0.58	164	3.02	0.37
Wave 4	158	3.11	0.82	158	3.65	0.51	158	3.13	0.40
Married									
Wave 1	55	3.18	.94	55	3.40	.56	55	3.00	.31
Wave 2	48	2.98	.98	49	3.47	.51	48	2.96	.32
Wave 3	49	2.96	.87	49	3.54	.60	49	2.97	.35
Wave 4	46	3.00	.92	46	3.53	.72	46	3.05	.38

Table 3 cont.

Outcome and Time In-Variant Predictor Variables: Descriptive Statistics

	Physical Health			Mental Health			Well-Being		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Single									
Wave 1	300	3.13	.91	300	3.36	.64	300	2.97	.40
Wave 2	261	3.03	.83	266	3.39	.62	264	2.96	.38
Wave 3	250	3.00	.75	250	3.55	.64	250	3.03	.42
Wave 4	238	2.98	.79	238	3.58	.59	238	3.09	.41
Minority									
Wave 1	300	3.14	.89	300	3.40	.61	300	3.02	.37
Wave 2	261	3.04	.85	267	3.44	.57	264	2.97	.35
Wave 3	255	2.99	.78	255	3.57	.60	255	3.04	.40
Wave 4	239	3.00	.83	239	3.57	.61	239	3.09	.42
White									
Wave 1	55	3.15	1.06	55	3.18	.69	55	2.72	.37
Wave 2	48	2.96	.87	48	3.4	.70	48	2.89	.46
Wave 3	44	3.05	.71	44	3.42	.82	44	2.89	.44
Wave 4	45	2.87	.69	45	3.54	.64	45	3.03	.37
12 + yrs educ.									
Wave 1	210	3.19	.90	210	3.42	.59	210	2.97	.39
Wave 2	187	3.09	.88	189	3.44	.56	188	2.98	.39
Wave 3	177	3.03	.76	177	3.63	.57	177	3.06	.41
Wave 4	174	3.00	.77	174	3.64	.55	174	3.11	.38

Table 3 cont.

Outcome and Time In-Variant Predictor Variables: Descriptive Statistics

	Physical Health			Mental Health			Well-Being		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
<12 yrs. educ.									
Wave 1	145	3.07	.94	145	3.29	.67	145	3.00	.37
Wave 2	122	2.93	.81	126	3.45	.66	124	2.93	.32
Wave 3	122	2.94	.76	122	3.43	.71	122	2.95	.40
Wave 4	110	2.95	.97	110	3.45	.69	110	3.04	.44
1 yr.+ sober									
Wave 1	196	3.12	.95	196	3.38	.64	196	3.06	.39
Wave 2	181	3.04	.83	185	3.47	.58	183	3.04	.37
Wave 3	174	3.02	.82	174	3.60	.60	174	3.08	.40
Wave 4	166	3.0	.83	166	3.59	.63	166	3.16	.41
<1 yr sober									
Wave 1	159	3.16	.88	159	3.34	.61	159	2.88	.36
Wave 2	128	3.00	.90	130	3.3	.62	129	2.84	.34
Wave 3	125	2.97	.71	125	3.47	.67	125	2.94	.41
Wave 4	118	2.95	.78	118	3.54	.59	118	2.97	.38

Attrition Analysis

Laudet, Becker & White (2009) reported findings from attrition analysis utilizing the Pathways data comparing individuals who were lost to follow up with those who contributed to all waves the study (N=288). Utilizing chi-square test for categorical variables and t-test for continuous variables, differences were evaluated in standard demographic variables (age, gender, race/ethnicity, educational attainment,) mental health, substance use (primary substance, baseline duration of abstinence, lifetime addiction) and substance treatment (previous exposure to substance abuse treatment and 12-step). Those who were lost to follow up were on average 3.5 years younger (40.0 vs. 43.5 years) and had sustained abstinence half as long (15.9 months vs. 31.7 months) as those who were retained. Differences were not found among any of the other variables examined.

Latent Growth Curve Analysis

Physical Health

Hierarchical linear modeling was used to model the latent growth curve for self-assessed physical health (SAPH) where time was nested within individuals engaged in the process of recovery from drugs and alcohol. The influence of social recovery capital (level-1) and stress (level-1) were examined while controlling for socio-demographic contextual factors, substance use and treatment histories. Results of growth curve analysis of SAPH for individuals in the process of recovery are presented in table 4.

The unconditional means model revealed an ICC of .34, indicating that 34% of the variance in SAPH scores is attributed to time invariant (level-2) individual

characteristics and 66% is attributable to within individual change over time. There is substantial variation in SAPH to be explained both between and within individuals.

The unconditional linear growth model (Model 1) indicates that there is a slight, but significant decrease in average SAPH for all participants each year (γ_{10}= -.05, p<.001). The unconditional linear component "wave" produced a reduction in unexplained variance with 14.79% of within person variance in SAPH attributable to time. On average at baseline individuals indicated their SAPH to be good (γ_{00}= 3.12).

The unconditional quadratic growth model was tested to determine if the growth curve for SAPH is best represented by a straight or curved line. Hypothesis testing indicated that the unconditional quadratic growth model was not an improvement over the unconditional linear growth model (x^2=3.33, p =.>.50). Taking both linear and quadratic findings together, change in SAPH across time is better described by a straight line rather than a curve. Visual examination of the linear slope confirms a negative slope or decline in SAPH over time for individuals recovering from drugs and alcohol (Figure 3). The random effects variance component for the unconditional linear model (Model 1) indicates that there is significant variation in SAPH across individuals (τ_{00}=0.45, p<.001) and across time (τ_{11}=0.04, p<.001).

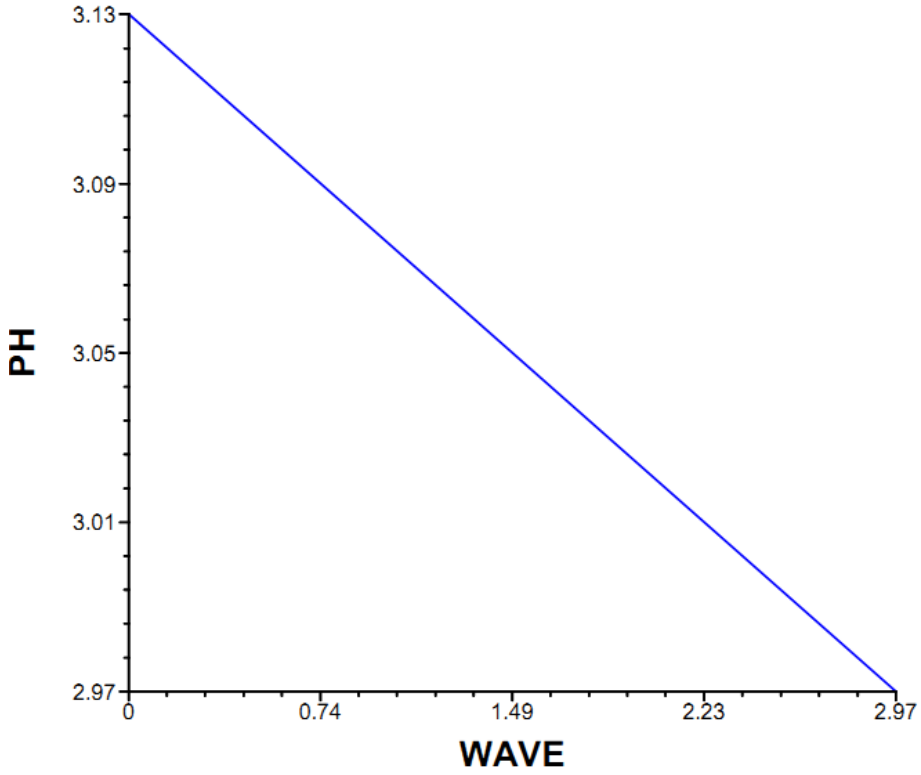


Figure 3. Average Physical Health over Time

The next step in analysis was to develop a conditional linear model with level-1 time varying predictors (Model 2). Included in the model were SRC variables (sober network affiliation and recovery support), stress variables (stress level and stressful life events), interaction effects between all SRC and stress variables, and sobriety status. Before adding level-2 predictors the model was re-specified to eliminate non-significant predictor variables (stressful life events and all interaction variables). Sober status was insignificant *(p*=.059), but was retained for examination in Model 3 because it was approaching significance. Only wave varied significantly between individuals. As such, stress level, sober network affiliation, and recovery support were fixed in subsequent analysis. Model 2 representing the final conditional linear growth model with level-1

predictors is represented in Figure 4. Using the model comparison test, Model 2 showed significant improvement over Model 1 ($\chi 2 = 57.05$, $p<.001$). Inclusion of these level-1 predictors in Model 2, account for 15% of the variability in SAPH.

Level-1 Model:

$Y_{it} = \beta_{0t} + \beta_{1t}(WAVE_{it}) + \beta_{2t}(SL_{it}) + \beta_{3t}(\mathrm{RS}_{it}) + \beta_{4t}(SN_{it}) + r_{it}$

Term	Description
Y_{it}	Self-reported physical health for an individual (i), at time (t)
β_{0t}	Intercept – initial level of physical health when all other factors are zero.
β_{1t}	Slope – Linear rate of change (direction and magnitude)
β_{2t}	Difference in physical health due to past year stress level
β_{3t}	Difference in physical health due to recovery support
β_{4t}	Difference in physical health due to sober network affiliation
r_{it}	Residual variance or error term for each individual

Figure 4. Level-1 Model for Physical Health

Time invariant control variables representing demographics, substance use and treatment career factors were added to Model 2. The chi-square model comparison test was used and variables that failed to reach significance were trimmed to achieve the final model (Model 3). With the addition of demographics, use and treatment career factors Model 3 showed significant improvement over Model 2 ($\chi 2 = 45.70$, $p<.001$).

The mean SAPH rating for individuals at baseline with average levels of stress, average size sober network, and average recovery support scores is 3.23 (SE= .05, $p<.001$). Women ($\gamma_{01} = -0.22$, $p<.001$) reported having poorer physical health than men. Age ($\gamma_{02} = -0.02$, $p<.001$) also had a significant effect on SAPH with older adults reporting poorer SAPH than younger adults.

Time (γ_{10} = -.06, p<.01) alone is responsible for a consistent annual decline in SAPH annually (γ_{10} = -.06). SRC factors, sober network affiliation (γ_{40} = 0.01, p<.01) and recovery support (γ_{30} = 0.25, p<.001), were both associated with improved SAPH tempering the negative effect of time.

Analysis confirms that SAPH is enhanced when individuals have support for sustained recovery (γ_{30} = 0.25, p<.001). It also confirms that the size of an individual's sober social network has a positive effect on how they assess their physical health. Those with larger sober networks (γ_{40} = 0.01, p<.001) report better SAPH ratings than those with smaller sober networks. The effect of the size of an individual's sober network on SAPH is influenced by the individual's marital status (γ_{41} = 0.02, p<.05) and education level (γ_{42} = -0.01, p<.05). Those who are unmarried tend to have better SAPH in relation to their married counterparts. However, the size of an individual's sober network is particularly influential for those who are married; so much so that those who are married with large sober networks have better physical health ratings than all other married and unmarried individuals. The influence of sober network size on SAPH is lessened for those who dropped out before graduating high school (γ_{42} = -0.01, p<.05) and matters more for those with more education. Educated individuals suffer larger declines SAPH when they have small or average size sober networks, but benefit more from a large sober network than those with less education.

Table 4 – Physical Health Models

	Model 1- Unconditional linear		*Model 2- Conditional w/ L1 predictors*		*Model 3 – Conditional w/ L1 & L2 Predictors*	
Fixed effects	*Coeff (SE)*	*t-ratio*	*Coeff (SE)*	*t-ratio*	*Coeff (SE)*	*t-ratio*
Intercepts (β_0)						
Intercept (γ_{00})	3.12(.05)	67.43***	3.13(.05)	67.80***	3.23(.05)	62.59***
Female (γ_{01})					-0.22(.06)	-3.65**
Age (γ_{02})					-0.02(.00)	-5.12***
Wave slope (β_1)						
Intercept (γ_{10})	-0.05(.02)	-2.75**	-0.06(.02)	-2.91***	-0.06(.02)	- 2.97***
Stress Level slope (β_2)						
Intercept (γ_{20})			-0.05(.01)	-5.79***	-0.05 (.01)	-6.09***
Recovery Support (β_3)						
Intercept (γ_{30})			0.23(.07)	3.37***	0.35(.07)	3.80***
Sober Network slope (β_4)						
Intercept (γ_{40})			0.01(.00)	1.89^{ns}	0.01(.00)	3.38***
Married (γ_{41})					0.02 (.01)	1.94*
HS drop out (γ_{42})					-0.01(01)	-2.39**
Random Effects (Var. Components)	*Variance*	*χ^2*	*Variance*	*χ^2*	*Variance*	*χ^2*
Intercepts (τ_{00})	0.45	809.22***	0.44	791.69***	0.40	752.55***
Wave Slope (τ_{11})	0.04	466.56***	0.03	446.61***	0.03	442.92***
Level-1 (e)	0.40		0.40		0.40	

* $p < .05$, ** $p < .01$, *** $p < .001$; *note –retained because approaching significance(ns= .059)*

Mental Health

Hierarchical linear modeling was used to model the latent growth curve for mental health where time was nested within individuals engaged in the process of recovery from drugs and/or alcohol. The influence of level-1 variables representing social recovery capital, stress, and sobriety status were examined while controlling for socio-demographic contextual factors, substance use, and treatment histories. Results of growth curve analysis of mental health for individuals in the process of recovery are presented in Table 5.

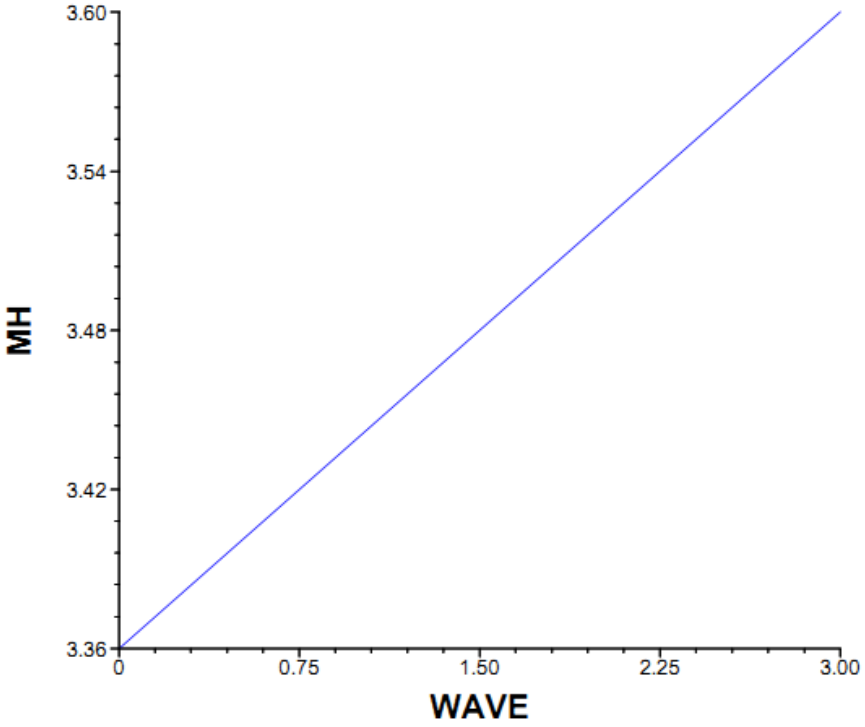


Figure 5. Average Mental Health over Time

The unconditional means model revealed an ICC of .35 indicating that 35% of the variance in mental health scores is between individuals and 65% is attributable to within individual change over time. With variability at both intra and inter individual levels,

there is sufficient justification to proceed with examination of an unconditional growth model.

Model 1, the unconditional linear growth model indicates that there is a slight, but significant improvement in average mental health for all participants each year (γ_{10} = .08, p<.001. The unconditional linear component "wave" produced a reduction in unexplained variance with 24.25% of within person variance in mental health attributable to time. The unconditional quadratic growth model was tested to determine if the growth curve for mental health is best represented by a straight or curved line. Hypothesis testing indicated that the unconditional quadratic growth model was not an improvement over the unconditional linear growth model (χ^2 =0.41, p>.500). Taking both linear and quadratic findings together, change in mental health across time is better described by a straight line rather than a curve. Visual examination of the linear slope confirms a positive slope or improvement in mental health over time for individuals recovering from drugs and/or alcohol (Figure 5). The random effects variance component for the unconditional linear model (Model 1) indicates that there is significant variation in mental health across individuals (τ_{00}=0.21, p<.001) and over time (τ_{11}=0.03, p<.001).

The next step in analysis was to develop a conditional linear model with level-1 time varying predictors (Model 2). Included in the model were SRC variables (sober network affiliation and recovery support), stress variables (stress level and stressful life events), interaction effects between all SRC and stress variables, and sobriety status. Before adding level-2 predictors the model was re-specified to eliminate non-significant predictor variables including sober network affiliation and corresponding interaction variables (sober network affiliation x stress level and sober network affiliation x stressful

life events) as well as the interaction effect for recovery support and stressful life events. Only wave and stressful life events varied significantly between individuals. As such, stress level, sober status, recovery support, and the variable representing the interaction between composite support and stress level were fixed in subsequent analysis. The final conditional linear growth model (Model 2) with level-1 predictors is represented in Figure 6. Model 2 showed significant improvement over Model 1 ($\chi 2 = 309.62$, $p<.001$).

Level-1 Model:

$Y_{it} = \beta_{0t} + \beta_{1t}*(WAVE_{it}) + \beta_{2t}*(SL_{it}) + \beta_{3t}*(LIFEEVEN_{it}) + \beta_{4t}*(RS_{it}) + \beta_{5t}*(SOBER_{it}) + \beta_{6t}*(SLXRS_{it}) + r_{it}$

Term	Description
Y_{it}	Mental health for individual (i), at time (t)
β_{0t}	Intercept – initial level of mental health when all other factors are zero
β_{1t}	Slope – Linear rate of change (direction and magnitude)
β_{2t}	Difference in mental health due to past year level of stress
β_{3t}	Difference in mental health due to past year # of stressful life events
β_{4t}	Difference in mental health due to recovery support
β_{5t}	Difference in mental health due to sobriety status (sober vs. relapsed).
β_{6t}	Difference in mental health due to the interaction between stressful life events & recovery support
r_{it}	Residual variance or error term for each individual

Figure 6. Level-1 Model for Mental Health

Next, time invariant control variables representing demographics, substance use and treatment career factors were added to Model 2. Variables that failed to reach significance were trimmed to achieve the final model, Model 3. With the addition of demographics, use and treatment career factors, Model 3 showed significant improvement over Model 2 ($\chi 2 = 22.35$, $p<.001$).

For individuals who report average levels of stress, average number of life events, average recovery support, and who are not sober, mental health ratings were on average is 2.06 (SE=.33, $\rho<.001$) at baseline. The more sever a person's addiction ($\gamma_{01} = -0.02$, $\rho<.001$), the poorer their mental health. The mental health of individuals in recovery improves slightly each year ($\gamma_{10}=0.08$, $\rho<.001$) with improvements in mental health for women occurring at a slower pace ($\gamma_{11} = -.05$, $\rho<.01$) than that of men. Stress has a significantly negative effect on mental health. The higher a person's past year stress ($\gamma_{20} = -.29$, $\rho<.001$) and the more stressful life events experienced in the last year ($\gamma_{20} = -.04$, $\rho<.001$), the worse their mental health. For whites, the number of stressful life events experienced had little effect on their mental health ($\gamma_{31} = .05$, $\rho<.05$). In contrast, minority non-whites were highly influenced by stressful life events with those who experience fewer life events having better mental health than those who experience average or more than average number of stressful life events. Whether a person is sober or not also has a significant influence on their mental health with those who were sober ($\gamma_{20} = .10$, $\rho<.01$) reporting better mental health than those who had relapsed. While stress in general is associated with a decrease in mental health at all levels of support, the effect of recovery support on mental health depends on the value of stress. There is an interaction effect between stress level and recovery support, such that when stress levels are low, low levels of recovery support are associated with better mental health, but when stress levels are high, the effect of support is reversed with higher support associated with lower levels of mental health. While there is clearly an interaction effect between support for recovery and stress, there is no evidence to suggest that support for recovery buffers the negative influences of stress on mental health. Instead, it appears that the

effects of high stress diminish the anticipated positive influence of recovery support on mental health.

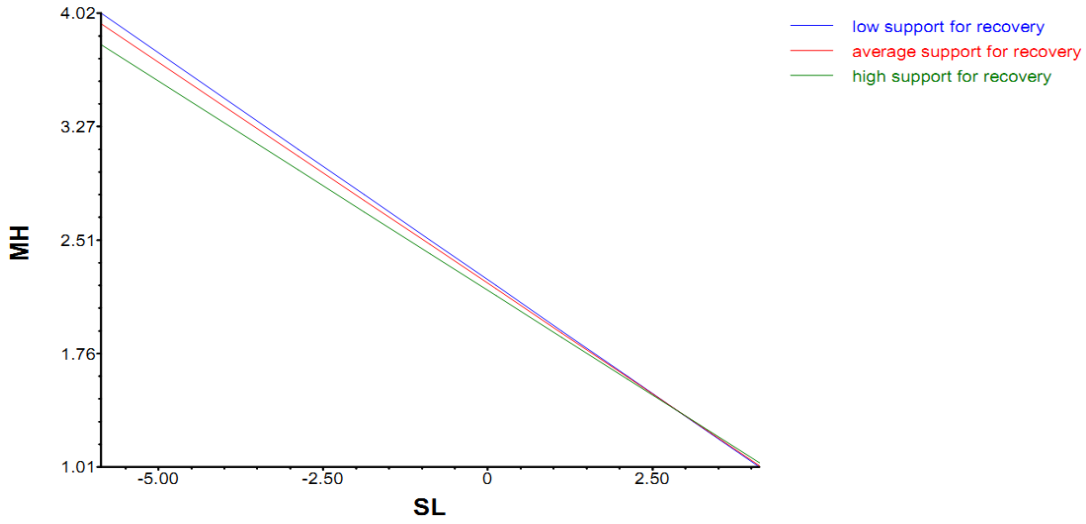


Figure 7. Interaction Effect between Support for Recovery and Stress Level.

Table 5 – Mental Health Models

	Model 1 - Unconditional Linear		*Model 2 - Conditional w/ L1 Predictors*		*Model 3 - Conditional w/ L1 & L2 Predictors*	
Fixed Effects	*Coeff (SE)*	*t-ratio*	*Coeff (SE)*	*t-ratio*	*Coeff (SE)*	*t-ratio*
Intercepts (β_0)						
Intercept (γ_{00})	3.36 (.03)	106.27***	2.08 (.27)	7.63***	2.06 (.27)	7.60***
Severity of Addiction (γ_{01})					-0.02 (.01)	-3.41***
Wave (β_1)						
Intercept (γ_{10})	0.08 (.01)	5.28***	0.06 (.01)	4.01***	0.08 (.01)	5.51***
Female (γ_{11})					-0.05 (.02)	-2.81**
Stress Level slope (β_2)						
Intercept (γ_{20})			-0.29 (.05)	-6.06***	-0.29 (.05)	-6.06***
Life Events (β_3)						
Intercept (γ_{30})			-0.04 (.01)	-4.13***	-0.04 (.01)	-4.81***
White (γ_{31})					0.05 (.02)	2.16*
Recovery Support (β_4)						
Intercept (γ_{40})			-0.21 (.08)	-2.56**	-0.21 (.08)	-2.52*
Sober Status (β_5)						
Intercept (γ_{50})			0.09 (.04)	2.40**	0.10 (.04)	2.74**
Stress Level X Recovery Support (β_6)						
Intercept (γ_{60})			0.07 (.02)	4.61***	0.07 (.02)	4.64***

Random Effects (Var. Components)	*Variance*	χ^2	*Variance*	χ^2	*Variance*	χ^2
Var. Intercepts (τ_{00})	0.21	821.21***	0.13	439.99***	0.13	440.22***
Var. Wave (τ_{10})	0.03	557.46***	0.01	362.90***	0.01	367.68***
Var. Life Events (τ_{30})			0.00	335.32**	0.00	338.29**
Level-1 (r)	0.19		0.17		0.17	

* $p < .05$, ** $p < .01$, *** $p < .001$

Well-being

Hierarchical linear modeling was used to model the latent growth curve for well-being where time was nested within individuals engaged in the process of recovery from drugs and alcohol. The influence of social recovery capital (level-1) and stress (level-1) were examined while controlling for socio-demographic contextual factors, substance use and treatment histories. Results of the growth curve analysis of well-being for individuals in the process of recovery are presented in Table 6.

Examination of the null or unconditional means model showed that mean well-being score of participants was 3. The unconditional means model also revealed an ICC of .43 indicating that 43% of the variance in well-being scores falls between individuals. With variability at both intra- and inter-individual levels, there is sufficient justification to proceed with examination of an unconditional growth model.

The unconditional linear growth model revealed that there was a slight, but significant increase in average well-being for all participants each year (γ_{10}=.03, SE=.01, p<.001). The conditional linear component "wave" produced a reduction in unexplained variance with 16.67% of within person variance in well-being attributable to time. The unconditional quadratic growth model (Model 1) was then tested to determine if the growth curve for well-being is best represented by a straight or curved line. Hypothesis testing confirmed that the unconditional quadratic growth model was an improvement over the unconditional linear growth model (χ^2=6.92, p=.008). Taking both linear and quadratic findings together, change in well-being across time was better described by a curve rather than a line, and the nature of this curvature did not vary significantly across subjects. Visual examination of the quadratic slope showed an initial decrease in well-

being followed by a gradual, but steady increase over time (Figure 8). The linear component was not significantly different from zero (γ_{10}=.-03, SE=.02, p>.05) after accounting for the quadratic trend (γ_{20}=.02, SE=.01, p<.01), but there was variability in the linear component across subjects (τ_{11}=.01 χ^2= 478.23, p<.001), such that some subjects might demonstrate a positive or a negative linear change across time, but on average the slope was zero. There was not significant variation in the quadratic component across subjects (τ_{22}=.00 χ^2=285.45, p >.50), indicating that individuals demonstrated roughly the same acceleration of change in well-being over time.

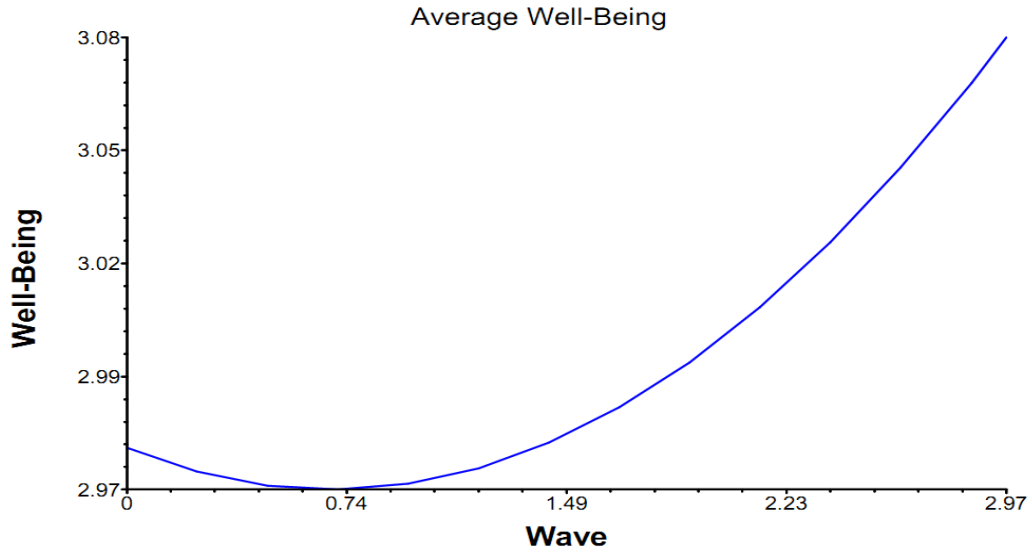


Figure 8. Average Well-Being over time.

The next step of analysis was to develop a conditional quadratic model with level-1 time varying predictors (Model 2). Included in the model were SRC variables (sober network affiliation and recovery support), stress variables (stress level and stressful life events), interaction effects between all SRC and stress variables, and sobriety status. Before adding level-2 predictors, the model was re-specified to eliminate non-significant

predictor variables (stressful life events and all interaction variables). Only wave and recovery support varied significantly between individuals. As such, stress level, sober network affiliation, and sober status were fixed in subsequent analysis. Model 2 representing the final conditional quadratic growth model with level-1 predictors is represented in Figure 9. Using the model comparison test, Model 2 showed significant improvement over Model 1 ($\chi 2 = 555.88$, $p<.001$).

Level-1 Model:

$Y_{it} = \beta_{0t} + \beta_{1t}(WAVE_{it}) + \beta_{2t}(WAVESQ_{it}) + \beta_{3t}(SL_{it}) + \beta_{4t}(RS_{it}) + \beta_{5t}(SN_{it}) + \beta_{6t}(SOBER_{it}) r_{it}$

Term	Description
Y_{it}	Existential Well-being subscale of the Spiritual Well-Being Scale for an individual (i), at time (t)
β_{0t}	Intercept – initial level of well-being when all other factors are zero.
β_{1t}	Slope – Linear rate of change (direction and magnitude)
β_{2t}	Non-linear rate of change over time (quadratic growth)
β_{3t}	Difference in well-being due to past year level of stress
β_{4t}	Difference in well-being due to recovery support
β_{5t}	Difference in well-being due to sober network affiliation
β_{6t}	Difference in well-being due to sobriety status (sober vs. relapsed)
r_{it}	Residual variance or error term for each individual

Figure 9. Final Conditional Quadratic Growth Model

The final conditional model (Model 3) includes both level-1 and level-2 predictors that contributed significantly to the final model. Model 3 showed significant improvement over Model 2 ($\chi 2 = 10.97$, $p<.01$). The mean well-being score for individuals at baseline with average levels of stress, average support for recovery, average size sober networks, who relapsed is 2.93 (SE= .03, $p<.001$). As was found in the unconditional quadratic model, the linear term remained insignificant ($\gamma_{10}= -0.03$, SE=0.02, $p>.05$). The quadratic growth term remained significant ($\gamma_{20}= 0.02$, SE=0.01,

$p<.001$) in the final conditional model. The trajectory of well-being for individuals in recovery declines initially, but accelerates in a positive direction over time. Both the linear and quadratic terms are significantly influenced by the severity of an individual's addiction at baseline. Those with more severe addictions show steeper linear declines (γ_{11}= -0.01, SE=.01, $p<.01$) in well-being than those with less severe addictions. However, change for those with more severe addiction occurs at a significantly faster pace (γ_{21}= 0.01, $p<.01$) than those who had less severe addictions.

Both SRC variables, support for recovery (γ_{40}= 0.55, SE=.03, $p<.001$) and sober network affiliation (γ_{50}= 0.01, SE=.00, $p<.001$), are associated with enhanced well-being for individuals in the process of recovering from addiction.

Past year stress level (γ_{30}= - .03, SE=.00, $p<.001$) has a statistically significant negative effect on well-being. While being married protects individuals from the negative effects of stress (γ_{31}= .02, SE=.00, $p<.001$), it also diminishes the benefit to well-being expected when stress levels are low. In contrast, those who are unmarried suffer more under high stress, but also benefit more from low stress than their married counterparts. To test the hypothesis that SRC buffers well-being from the effects of stress, interaction effects between each SRC variable and each stress variable were included in the model. All interaction effects were insignificant and trimmed from the final model.

Table 6 – Well-Being Models

	Model 1- Unconditional Quadratic		*Model 2- Conditional w/ L1 predictors*		*Model 3 – Conditional w/ L1 & L2 Predictors*	
Fixed effects	*Coeff(SE)*	*t-ratio*	*Coeff(SE)*	*t-ratio*	*Coeff(SE)*	*t-ratio*
Intercepts (β_0)						
Intercept (γ_{00})	2.98(.02)	147.38***	2.93(.03)	107.89***	2.93(.03)	107.00***
Wave (β_1)						
Intercept (γ_{10})	-0.03(.02)	-1.18	-0.03(.02)	-1.43	-0.03(.02)	-1.35
Addiction severity (γ_{11})					-0.02(.01)	-2.43*
WaveSq (β_2)						
Intercept (γ_{20})	0.02(.01)	2.72**	0.02(.01)	3.00***	0.02(.01)	2.94***
Addiction severity (γ_{21})					0.01(.00)	2.39**
Stress Level (β_3)						
Intercept (γ_{30})			-0.03(.00)	-8.69***	-0.03(.00)	-8.61***
Married (γ_{31})					0.02(.01)	3.10***
Recovery Support (β_4)						
Intercept (γ_{40})			0.55(.03)	16.07***	0.55(.03)	16.12***
Sober Network (β_5)						
Intercept (γ_{50})			0.00(.00)	3.19**	0.00(.00)	2.44***
Sober Status (β_5)						
Intercept (γ_{60})			0.05(.02)	2.03*	0.05(.02)	2.17*
Random Effects (Var. Components)	*Variance*	χ^2	*Variance*	χ^2	*Variance*	χ^2
Intercepts (τ_{00})	0.07	-749.38***	0.03	423.91***	0.03	426.37***
Wave (τ_{11})	0.01	478.23***	0.00	341.45**	0.00	342.64**
Recovery Support (τ_{41})			0.11	384.02***	0.11	368.64***
Level-1 (e)	0.07		0.05		0.05	

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 7 - Final Models

Fixed effects	*Physical Health*		*Mental Health*		*Well-Being*	
	Coeff(SE)	*t-ratio*	*Coeff(SE)*	*t-ratio*	*Coeff(SE)*	*t-ratio*
Intercepts						
Intercept	3.23(.05)	62.59***	2.06(.27)	7.60***	2.93(.03)	107.00***
Female	-0.22(.06)	-3.65***				
Age	-0.02(.00)	-5.12***				
Severity of Addiction			-0.02(.01)	-3.41***		
Wave						
Intercept	-0.06(.02)	-2.97***	0.08(.01)	5.51***	-0.03(.02)	-1.35
Female			-0.05(.02)	-2.81**		
Addiction severity					-0.02(.01)	-2.43*
Quadratic growth						
Intercept					0.02(.01)	2.94***
Addiction severity					0.01(.00)	2.39*
Stress level						
Intercept	-0.05(.01)	-6.09***	-0.29(.05)	-6.06***	-0.3(.00)	-8.61***
Married					0.02(.01)	3.10***
Stressful Life Events						
Intercept			-0.04(.01)	-4.81***		
White			0.05(.02)	2.16**		
Recovery Support						
Intercept	0.35(.07)	3.80***	-0.21(.08)	-2.52**	0.55(.03)	16.12***
Sober Network						
Intercept	0.01(.00)	3.38***			0.00(.00)	2.44***
Married	0.02(.01)	1.94*				
HS drop out	-0.01(.01)	-2.39**				
Sobriety Status						
Intercept			0.10(.04)	2.74**	0.05(.02)	2.17*
Stress Level X Recovery Support						
Intercept			0.07(.02)	4.64***		
Random Effects (Var. Components)	*Variance*	χ^2	*Variance*	χ^2	*Variance*	χ^2
Intercepts	0.40	752.55***	0.13	440.22***	0.03	426.37***
Wave	0.03	442.92***	0.01	367.68***	0.00	342.64**
Recovery Support					0.11	386.64***
Stressful Life Events			0.00	338.29**		
Level-1 (e)	0.40		0.17		0.05	

* $p < .05$, ** $p < .01$, *** $p < .001$

CHAPTER FIVE – Discussion

It was the intent of this study to build on contributions of those utilizing the life course perspective to understand the process of recovery by seeking to determine if the positive influence of SRC extends beyond sobriety to directly affect global health domains of recovery and if individual elements of SRC would serve to buffer the negative effects of stress on self-assessed physical health, mental health, and well-being over time. Another goal of this study was to identify distinct trajectories of global health as differentiated by socio-demographic contextual factors, substance use, and treatment career variables. With little previous exploration of the cross over effects of SRC on global health outcomes, this study strives to establish increased appreciation and interest in utilization of a holistic multi-dimensional approach to the study of recovery across the life course.

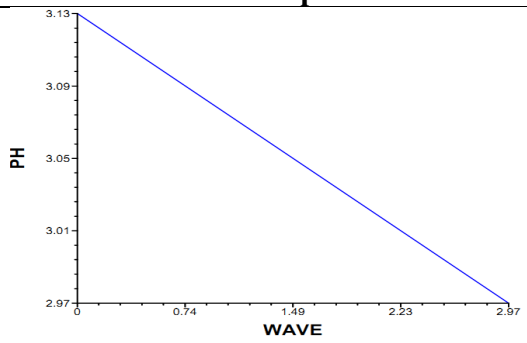
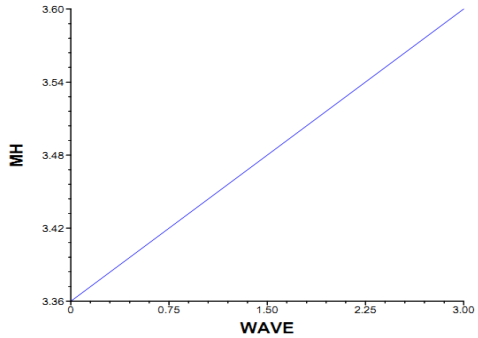
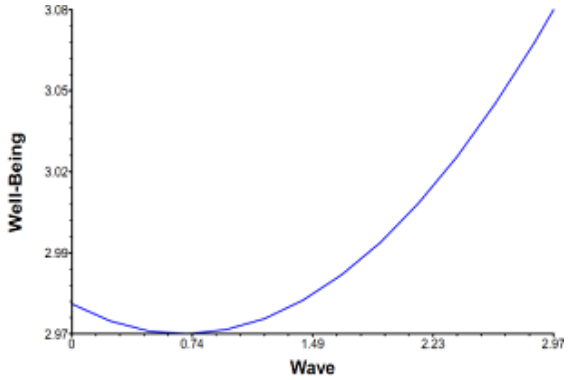
As was discussed in Chapter 2, this study utilizes a robust community based sample of individuals engaged in the process of recovery to chart trajectories of global health over a 4 year period. Latent growth curve modeling was carried out using HLM to model the influence of SRC on global health domains of recovery. Additionally, this study sought to help clarify the relationship between SCR, stress, and global health by testing to see if SRC serves to buffer the negative influences of stress on self-reported physical health, mental health functioning, and well-being.

Outcomes for this study confirm that there are unique trajectories of physical health, mental health, and well-being for individuals with a history of addiction to substances. While the three global health domains under investigation here demonstrate

very different trajectories of change over the 4 years, elements of SRC exert significant influence over the shape of those trajectories. As expected, the level of stress experienced over the previous year has a significant and negative effect on global health across domains. However, the number of stressful life events a person has experienced in the last year in only negatively associated with mental health. Also tested was the role of social recovery capital in buffering the negative effects of stress on physical health, mental health, and well-being. Support for recovery buffered the negative effects of stress on mental health when stress levels were high, but no SRC variables served to buffer the negative effects of stress or stressful life events on the other global health domains under investigation.

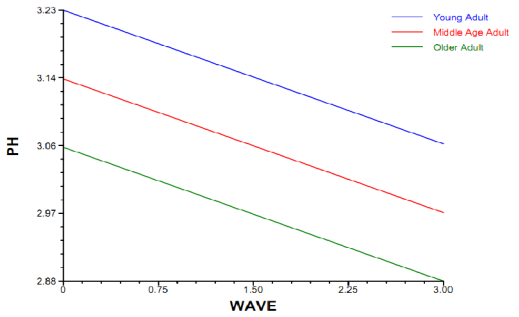
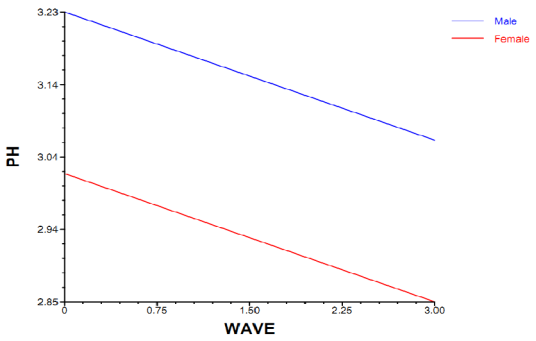
Research Questions and Hypotheses

Q1. For individuals recovering from addiction, how do global health indicators of physical health, mental health, and well-being change over time?

#	Hypothesis	Outcome	Graph
1	Self-assessed physical health (SAPH) will decline over time.	**Confirmed** – negative linear trajectory	
2	**Mental health** will improve over time, but only after an initial decline.	**Partially Confirmed** – positive linear trajectory	
3	**Well-being** will improve over time.	**Partially Confirmed** Quadratic J-shaped trajectory	

Q2. Do socio-demographic characteristics differentiate global health trajectories?

PHYSICAL HEALTH

#	Hypothesis	Outcome	Graph
4	As individuals get older, their levels of SAPH will decline.	**Confirmed** Significant Difference	
5	Men will have higher levels of **SAPH** than women.	**Confirmed** Significant Difference	

#	Hypothesis	Outcome
6	Married individuals will have higher **SAPH** ratings than those who are unmarried.	**NOT Confirmed** No Significant Difference
7	Those with higher levels of education will have higher levels of **SAPH** than those with lower levels of education.	**NOT Confirmed** No Significant Difference
8	Minority (non-White) individuals will have lower **SAPH** ratings than Whites.	**NOT Confirmed** No Significant Difference

MENTAL HEALTH

#	Hypothesis	Outcome
9	As individual age their **mental health** will decline.	**NOT Confirmed** No Significant Difference
10	Women will have poorer **mental health** than men.	**NOT Confirmed** No Significant Difference
11	Married individuals will have better **mental health** ratings than those who are unmarried.	**NOT Confirmed** No Significant Difference
12	Those with a high school degree or higher level of education will have better **mental health** than those who left high school before graduating.	**NOT Confirmed** No Significant Difference
13	Individuals reporting minority status affiliation will have poorer **mental health** ratings than Whites.	**NOT Confirmed** No Significant Difference

WELL-BEING

#	Hypothesis	Outcome
14	**Well-being** will not vary in relation to age.	**Confirmed** No Significant Difference
15	**Well-being** will not vary in relation to gender.	**Confirmed** No Significant Difference
16	**Well-being** will not vary in relation marital status.	**Confirmed** No Significant Difference
17	Those with higher levels of education will have higher levels of **well-being** than those with lower levels of education.	**NOT Confirmed** No Significant Difference
18	Minority (non-White) individuals will have lower levels of **well-being** than Whites.	**NOT Confirmed** No Significant Difference

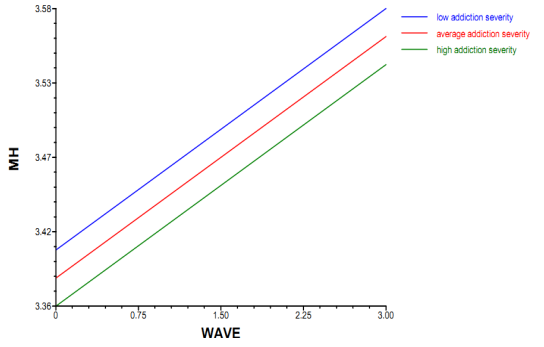
Q3. Do substance use and career factors influence global health trajectories?

PHYSICAL HEALTH

#	Hypothesis	Outcome
19	**SAPH** will not vary in relation to time sober.	**Confirmed** No Significant Difference
20	Trajectories of **SAPH** will not be different for those who previously participated in substance abuse treatment in comparison to those who have not.	**Confirmed** No Significant Difference
21	Those with higher addiction severity at baseline will have poorer **SAPH.**	**NOT Confirmed** No Significant Difference

MENTAL HEALTH

#	Hypothesis	Outcome
22	Time sober will be positively associated with **mental health** functioning over time with those who have more than one year sober at baseline showing higher rates of mental health functioning than those with less than one year sober at baseline.	**NOT Confirmed** No Significant Difference
23	Trajectories of **mental health** will not be differentiated for those who previously participated in substance abuse treatment in comparison to those who have not.	**Confirmed** No Significant Difference

#	Hypothesis	Outcome	Graph
24	Those with higher addiction severity at baseline will have poorer **mental health.**	**Confirmed** Significant Difference	

WELL-BEING

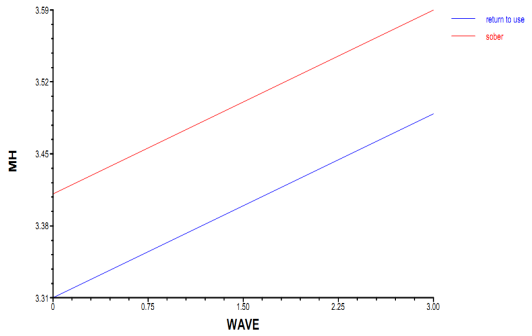
#	Hypothesis	Outcome
25	Those with more time sober at baseline will have higher levels of **well-being.**	**NOT Confirmed** No Significant Difference
26	Trajectories of **well-being** will not be differentiated for those who have or have not previously participated in substance abuse treatment.	**Confirmed** No Significant Difference
27	Those with higher addiction severity at baseline will have lower levels of **well-being.**	**NOT Confirmed** No Significant Difference

Q4. How does relapse shape global health trajectories?

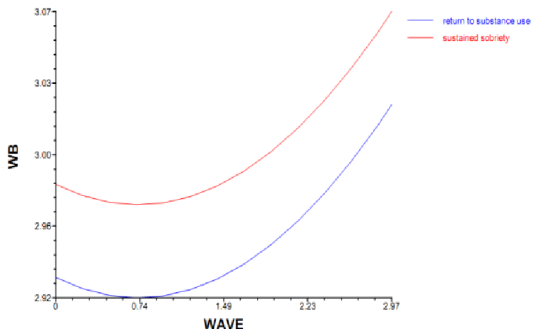
PHYSICAL HEALTH

#	Hypothesis	Outcome
28	Return to abuse of substances (relapse) in the past year will have a negative effect on trajectories of **SAPH.**	**Not Confirmed** No Significant Effect

MENTAL HEALTH

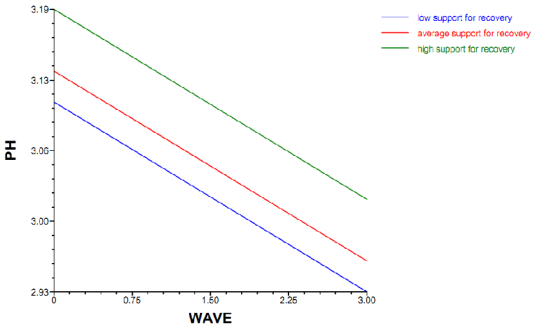
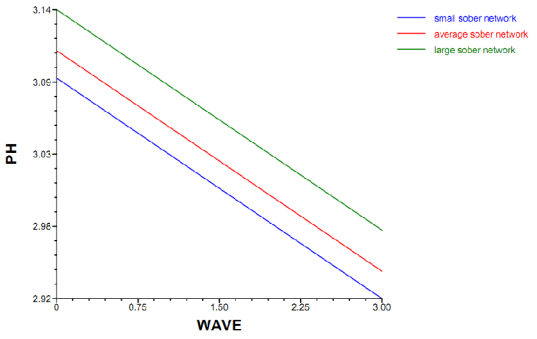
#	Hypothesis	Outcome	Graph
29	Return to abuse of substances (relapse) in the past year will have a negative effect on trajectories of **mental health**.	**Confirmed** Negative Effect	

WELL-BEING

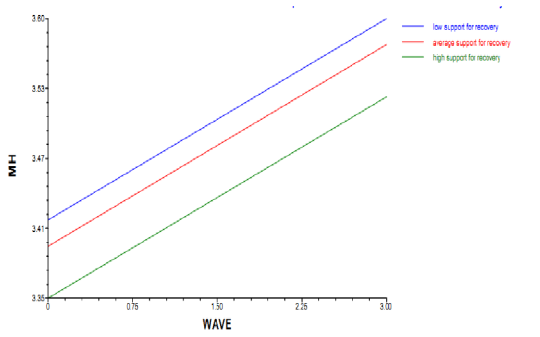
#	Hypothesis	Outcome	Graph
30	Return to abuse of substances (relapse) in the past year will have a negative effect on trajectories of **well-being.**	**Confirmed** Negative Effect	

Q5. How does <u>social recovery capital</u> influence global health trajectories (physical health, mental health, and well-being) for individuals on the path to recovery?

PHYSICAL HEALTH

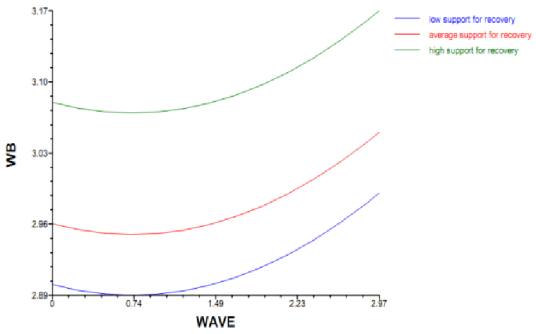
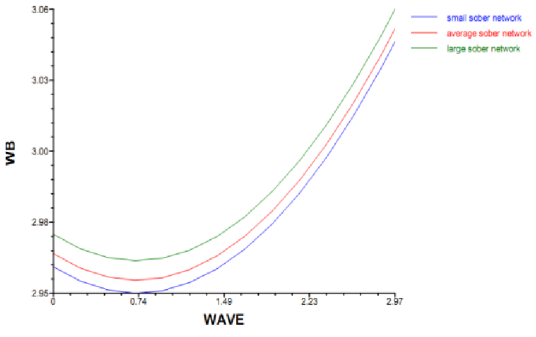
#	Hypothesis	Outcome	Graph
31	Higher levels of perceived recovery support will be associated with higher levels of **SAPH.**	**Confirmed** Significant Difference	
32	Larger sober network affiliation will be associated with better **SAPH.**	**Confirmed** Significant Difference	

MENTAL HEALTH

#	Hypothesis	Outcome	Graph
33	Higher levels of perceived recovery support will be associated with better **mental health**.	**NOT Confirmed** Significant Difference	

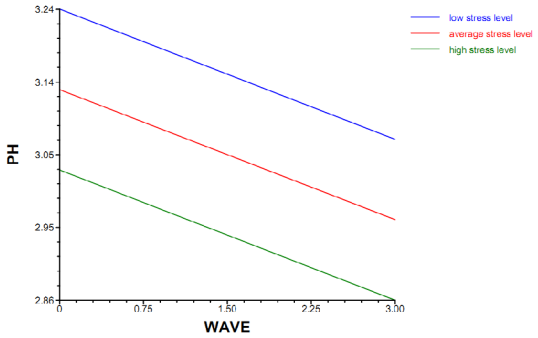
#	Hypothesis	Outcome
34	Larger sober network affiliation size will be associated with better **mental health**.	**NOT Confirmed** No Significant Difference

WELL-BEING

#	Hypothesis	Outcome	Graph
35	Higher levels of perceived recovery support will be associated with better **well-being.**	**Confirmed** Significant Difference	
36	Larger *sober network affiliation size* will be associated with better **well-being.**	**Confirmed** Significant Difference	

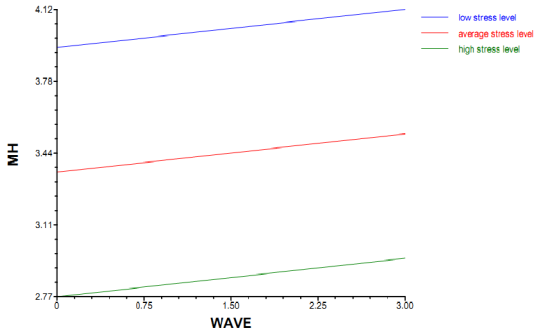
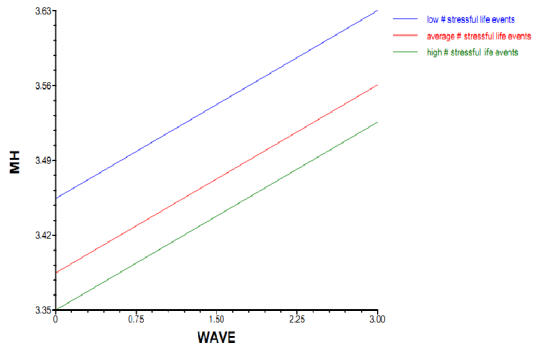
Q6. Does stress negatively influence global health trajectories?

PHYSICAL HEALTH

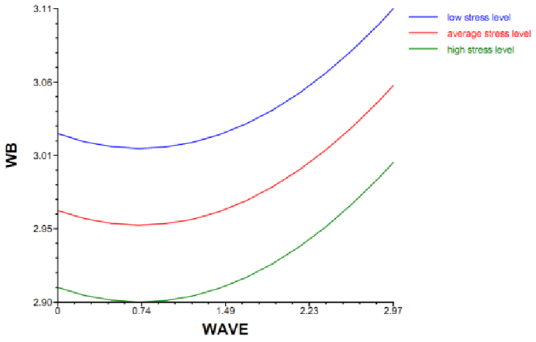
#	Hypothesis	Outcome	Graph
37	Higher levels of stress will be associated with poorer **SAPH.**	**Confirmed** Significant Difference	

#	Hypothesis	Outcome
38	As number of stressful life events increase **SAPH** declines.	**NOT Confirmed** No Significant Difference

MENTAL HEALTH

#	Hypothesis	Outcome	Graph
39	Higher levels of stress will be associated with poorer **mental health**.	**Confirmed** Significant Difference	
40	As number of stressful life events increase **mental health** declines.	**Confirmed** Significant Difference	

WELL-BEING

#	Hypothesis	Outcome	Graph
41	Higher levels of stress will be associated with poorer **well-being.**	**Confirmed** Significant Difference	

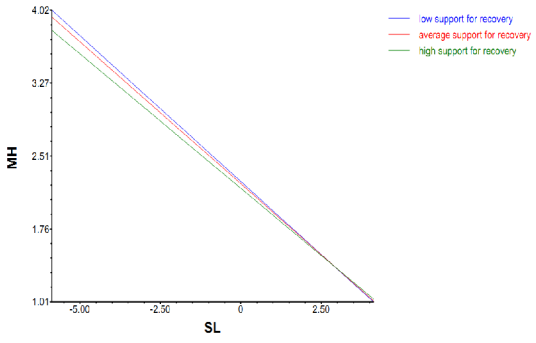
#	Hypothesis	Outcome
42	As number of stressful life events increase, **well-being** will decline.	**NOT Confirmed** No Significant Difference

Q7. Does social recovery capital buffer the negative effects of stress on global health outcomes for individuals on the path to recovery?

PHYSICAL HEALTH

#	Hypothesis	Outcome
43	Perceived recovery support will *directly* influence **SAPH.**	**Confirmed** Direct Effect
44	Sober network affiliation size will *directly* influence **SAPH**.	**Confirmed** Direct Effect

MENTAL HEALTH

#	Hypothesis	Outcome	Graph
45	Perceived recovery support will buffer the negative effect of stress on **mental health**.	**Confirmed** Buffer Effect	

#	Hypothesis	Outcome
46	Sober network affiliation size will *directly* influence self-assessed **mental health** ratings.	**NOT Confirmed** No Significant Effect

WELL-BEING

#	Hypothesis	Outcome
47	Perceived recovery support will buffer the negative effects of stress on **well-being.**	**NOT Confirmed** Direct Effect
48	Sober network affiliation size will *directly* influence **well-being.**	**Confirmed** Direct Effect

With the exception of Dennis, Foss, & Scott (2007), and Laudet and White (2008), few have attempted to explain or understand the factors that influence domains of recovery beyond sobriety alone. This dissertation was partially inspired by their work, and strives to contribute to the evidence base they are creating which suggests that recovery is a multidimensional construct necessitating an array of formal and informal interventions across the life span. In their 2007 study, Dennis & colleagues utilized the life course perspective to frame their holistic approach to understanding the process of recovery. They explain that the life course perspective is built on three key concepts: turning points, timing, and capital. Experience such as the decision to initiate a path of recovery, can serve as a turning point with ripple effects altering the course of related trajectories over time. Timing, when or at what age an event occurs interfaces with the experience to distinguish if that event will become a turning point or if instead it will remain merely an experience. Finally, capital or recovery capital more specifically reflects the context and resources available to a person that also interact with the experience and timing of the event too influence whether the event raises to the level of a turning point. The life course perspective takes into consideration the reality that each individual's trajectories are unique, but that there may be common capital or timing experiences that distinguish the shape of trajectories.

Utilizing four waves of data from a community based sample of individuals on the path to recovery, this study sought to contribute to a more holistic understanding of recovery across the life course by examining social contextual factors that shape several global health trajectories associated with recovery.

Physical Health

National and global studies show that SAPH either improves or remains stable until around age 50 when it either levels off or begins to decline (Deaton, 2010; MCullough & Laurenceau, 2004). For those who struggled with substance abuse and strive to recover from their addiction, it appears the consequence of their use and involvement in the drug culture has serious implications for their long term health. This study found evidence that for those striving to recover from addiction, not only does their physical health not improve or level off, it declines. This decline occurs regardless of socio-demographic characteristics, substance use or treatment career, stress, or presence of SRC.

It has long been understood that an addictive lifestyle places individuals at heightened risk for a large number of chronic and terminal physical illnesses (Drake, Kaye, McKetin, & Duflou, 2008; Abraham, Degli-Esposti, & Marino, 1999, Hirshfield, et al., 2004, Zucker, 2000). Abuse of drugs and/or alcohol is directly related to increases in liver and kidney disease (Greenwell & Breecht, 2003), and alcohol alone has been linked to 3.8% of global deaths and 4.6% of global disability (Rehm et al., 2009). Those who abuse substances are also more likely to engage in risky sexual behaviors, share needles and be victims of violence (Mackesy-Amiti, Fendrich, & Johnson, 2010; Gogineni, Stein & Friedmann, 2001; Littleton & Breitkopf, 2006) which in turn increases the likelihood they will contract diseases with serious life threatening diseases such as HIV/AIDS and Hepatitis C (Mackesy-Amiti, Fendrich, & Johnson, 2010; Abraham, Degli-Esposti, & Marino, 1999).

Consistently the literature has reported that men report experiencing better physical health than women (Green, Perrin & Polen, 2004; McCulloughy & Laurenceau, 2004). Evidence for this pattern was further validated in this study of individuals recovering from drugs and/or alcohol suggesting that prioritization of women's health care needs and interventions targeting prevention and treatment for women is essential. Women are more often than not, lured into abuse of substances by a male partner who is already actively engaged in abuse of substances. In comparison to men, women are also more likely to suffer significant injury as a result of interpersonal violence, sexual assault and prostitute themselves in order to sustain their drug habit (Stets & Straus, 1990; Ellios, Mok, & Brier, 2005; Logan, Cole, & Leukefeld, 2003). Even when engaging in consensual sex, women often lack the self-worth in the face of power differentials, to insist a partner use condoms as a means for preventing transmission of sexually transmitted disease (Pulerwitz, Armaro, De Jong, Gortmaker, & Rudd, 2002). These factors place women, especially those struggling with addiction, at significantly higher risk for contracting serious diseases.

Women are also more often than not the primary if not sole care takers for their children. This responsibility frequently impedes women from accessing health care and addiction treatment, especially when treatment requires extended inpatient stays. Difficulties managing consistent employment result in financial constraints that further impede women's ability to get health insurance, access treatment, or support services for things like transportation and childcare. While men also struggle with unemployment issues and financial problems, not being the primary care provider for their children frees them to more readily access the care they need when they need it.

In contrast with a substantial body of literature that suggests being married is a protective factor that affords people access to financial resources and the support necessary to access the care they need when they need it, this study found that being married did not contribute to improved physical health. It is likely that many of the benefits of marriage are forfeited by those who struggle with addiction. Addiction is also a disease that brings significant stress and strain into a marriage/family damaging both social relationships and often draining bank accounts due to both purchase of substances and payment for treatment. Often for those who struggle with substance abuse, intimate and/or marital relationships are also often fraught with violence and exposure to partner substance abuse (Amaro & Fanta, 1995).

This study also reminded us that as people age, especially those recovering from addiction, they are especially vulnerable to declining health. The added vulnerability for our aging recovery population is likely intensified by the finding that time sober and episodic return to substance abuse (relapse) over time have no bearing on health trajectories. This dissertation study contributes to a growing research base that suggests once a person has become addicted to substances they have at the same time been set on a path of declining health. Their ability to remains sober or avoid relapse does not alter that course in any way. Dennis, Foss, & Scott, 2007 examined health outcomes for individual in recovery and concluded that health did not improve in relation to duration of abstinence. Schutte, Nichols, Brennan, & Moos, 2003 also studied physical health outcomes over time by comparing a sample of older non-drinkers with former drinkers over a 10 year period. They found that the mortality rate of former drinkers was 1.6 times those of non-drinkers. It is clear that recovering addicts face higher rates of

mortality, have more complex health care needs, and do not experience improvements in their physical health when they stop abusing substances.

In seeking to understand what factors enhance a person's ability to remain sober, Cloud & Granfield suggested it was necessary to understand what aspects of recovery capital a person has that they can use to both get and stay sober. Evidence suggests social forms of recovery capital such as social support, support for recovery and structural social network characteristics are associated with enhanced sobriety outcomes (Beattie & Longabaugh, 1997; Mohr et al., 2001). This study sought to discover if the influence of social recovery capital extended beyond sobriety to other domains of recovery, such as physical health. Evidence from the research presented here suggests that when individuals have higher levels of specific support for recovery and are members of larger sober networks, they are more likely to report having better physical health, confirming the link between social recovery capital and physical health.

While stress can play an integral role in motivating individuals to pursue sobriety, it has equal if not more negative influence over time on both efforts to recover from addiction and physical health. Outcomes form this study support the mass of evidence gathered to date that suggests the perceived level of stress a person experiences can have seriously damaging effects on physical health (Rod, et al., 2009; Cadzow & Servoss, 2009). There is also a solid body of literature linking individual's exposure to stressful life events with health outcomes in areas such as breast cancer in women, HIV progression, psoriasis and rates of mortality (Kornblith et al., 2001; Leserman et al., 2000; Naldi, Peli, Parazzini, & Carrel, 2001; Rosengren, Orth-Gomer, Wedel, & Wilhelmsen, 1993). While evidence from these other studies supported the hypothesis

that more exposure to stressful life events would be associated with poorer physical health ratings, the data from this dissertation research did not, and the hypothesis could not be confirmed.

Delving deeper into other factors that influence the physical health of those recovering from addiction, this study sought to shed light on the relationship between stress, social forms of recovery capital and physical health in order to elucidate weather SRC directly affects physical health, or if the relationship is indirect via a buffering scenario. The direct effect model suggests that support and network affiliation add benefit to individuals' lives during both stressful and non-stressful times, whereas the buffering hypothesis suggests support and network affiliation only add benefit during time s of stress by diminishing stress' negative influences (Cohen & Wills, 1985; Taylor & Aspinwall, 1996; Kawachi & Berkman, 2001).

Researchers have examined direct and buffering effects of stress and structural network factors in relation to physical health, but to date no one has attempted to understand the mechanism of action through which recovery specific support and sober network affiliation influence physical health for individuals in recovery. Findings from this study confirm that social recovery capital does not buffer the negative effects of stress and instead provide direct benefit to health regardless of the level of stress experienced by those in recovery.

Mental Health

Outcomes from this study offer hope for those choosing a path to recovery, as findings suggests that individuals at all phases of recovery regardless of socio-demographic factors, duration of abstinence or treatment history, experience improved

mental health over time. This finding was surprising given contradictory findings that suggest when individuals venture down the path of recovery, life does not get easier, and when life is hard individuals are more likely to suffer declines in mental health. The only use career factor that was found to significantly alter mental health functioning over time is severity of addiction, such that the more severe a person's addiction at the beginning of the study, the poorer their mental health functioning over time. This finding suggests efforts to prevent addiction or minimize the severity of people's addiction careers may prove especially beneficial in enhancing mental health outcomes over time.

Evidence from previous studies suggests that women, minorities, and unmarried individuals are particularly vulnerable to mental illness (Palner & Mittlemark, 2002; Kessler & Neighbors; Turner et al., 1995). Rates of comorbid mental illness and addiction have also been found among minority groups, individuals with low levels of education, young adults, and individuals who are single (Compton et al., 2007, Kessler et al., 2005). It is interesting that in the current study none of these socio-demographic characteristics remained significant predictors of mental health when active substance use, social recovery capital factors, and stress were included in the model.

In order to identify factors that placed individuals at increased risk for relapse and conversely, factors associated with sustained sobriety, Schutte, Nichols, Brennan, & Moos (2003) compared a sample of older adults who had managed to sustain sobriety for 10 years with a sample of individual who had never had a problem with drinking. They found no significant difference in depressive symptoms or psychotropic medication consumption between the two groups suggesting that sustained sobriety plays a significant role in alleviation of mental health symptoms. Also looking at mental health

outcomes over an extended period of time, Denis, Foss, & Scott (2007) reported that mental health trajectories were initially characterized by an increase in mental distress between years 1 and 3 of sobriety, followed by shift toward improved mental health. Taken together these studies suggest mental health may initially decline, but if people can achieve sustained sobriety, mental health improvements are possible.

Participants in this dissertation study ranged in time sober at baseline from one month to 10 years (M=26.5, SD=31.5), and no evidence was found that would support the conclusion that 3 or more years of sustained sobriety is necessary before mental health improves. Instead, outcomes suggest that improvements in mental health are more immediate and do not necessitate long term sustained sobriety. One possible explanation for this dynamic is that the mental health symptoms experienced by this sample were directly a result of their substance abuse rather than an organic underlying mental illness. If so, those experiencing substance induced psychological symptoms such as depression and anxiety would experience relief soon after initiating sobriety, and should relapse occur, mental health symptoms for this group of people would be expected to resolve again as soon as they return to abstinence.

There is a significant difference between the rate at which men and women's mental health changes, with men improving at a significantly faster pace than women. While it is heartening that women in recovery experience improved mental health over time, the disparity between men and women is concerning, and may reflect persistent and pervasive social inequalities in society. As discussed in relation to physical health outcomes, it is likely that barriers to access of resources as well as child rearing obligations interfere with women's ability to get what they need to heal at the same rate

as men. Another barrier woman in recovery report as interfering with their ability to access care is lack of support from their male partners (Amaro & Hardy-Fanta, 1995; Havassy, et al., 1991). It also possible that the types of mental illnesses women suffer from are more severe and have more enduring effects than those men endure. Women tend to suffer from more mental health conditions characterized by internalization such as depression or anxiety while conditions suffered by men tend to be characterized by externalization behavior such as anti-social personality disorder (Eaton et al., 2012). Women are also more susceptible to developing PTSD when exposed to trauma of a non-sexual nature, and they are also more likely to experience sexually based traumas then men. Internalizing disorders and trauma are both thought to have serious enduring effects on brain functioning which pose unique treatment challenges. Taken together, all of these possible explanations suggest women are clearly at elevated risk for enduring mental health struggles than men.

As hypothesized, both how stressed people feel and their exposure to stressful life events were found to be associated with diminished mental health functioning in recovering addicts. Often individuals turn to abuse of substance as means for coping with negative emotions and stress (Abbey, Smith, & Scott, 1993; Grant, Stewart, & Mohr, 2009). When they give up substances, finding alternative ways to cope with stress and emotional distress is necessary, but not easy to do. While there is evidence that stress decreases in relation to duration of abstinence (Laudet, Morgen, & White, 2006), for some on the path to recovery, stress levels remain quite high (Weaver, Turner, & O'Dell, 2000). This research study provides additional evidence that those who sustain sobriety

and recover from addiction do so despite high levels of stress and ongoing exposure to stressful life events rather than in the absence of them.

In order to get a better understanding of how social recovery capital influences recovery domains other than sobriety, this study sought to determine if the number of sober affiliates in one's social network, and recovery specific support would positively influence the mental health of individuals recovering from addiction. Barnett & Gotlib (1988) conducted a comprehensive literature review in order to better differentiate antecedents, concomitants and consequences associated with depression and psychological functioning. Findings from this literature review suggest there is substantial evidence linking social ties to mental health functioning, such that depression is more prevalent among those who lack social integration or connections. Kendler, Karkowski, & Prescott (1998) more specifically found evidence that exposure to more stressful life events influenced not only the onset, but the course of depression.

While the literature suggests that having more people with whom to connect would enhance mental health outcomes by enhancing a sense of belonging or connection, outcomes from this study only partially support that sentiment with recovery support being the only social recovery capital variable in the model to significantly influence mental health functioning. More specifically, when stress levels are high, support for recovery was found to buffer the negative effects of perceived stress on mental health. In times of high stress having more support for recovery is particularly beneficial.

This is the first study to offer evidence that recovery support like general social support buffers the effect of stress on outcomes that are not specific derivatives of abstinence. General social support and recovery support are similar constructs. While

there is no previous evidence indicating recovery support would buffer stress, there is a substantial body of literature suggesting that general social support serves to buffer the negative effects of stress on depression, psychological functioning, and mental health more generally (Kawachi & Berkman, 2001; LaRocco, House, & French, 1980; Cadzow & Servoss, 2009). While most have shown that social support buffers stress, evidence to the contrary was found by Mulia et al. (2008) who concluded that social support was not an effective buffer for stress on the psychological health of disadvantaged women. Additional research is needed to determine if recovery specific support offers additional benefit to the influence of general social support and to clarify the discrepancy reported by Mulia and colleagues (2008).

Well-Being

Well-being is an interesting construct to the study of recovery because it offers a holistic assessment of how life is going for people. With recovery being a multi-dimensional construct ascertaining a general sense of how people feel about the condition of their lives may prove to be an especially valuable recovery indicator. As such it is no surprise that outcomes such as well-being and quality of life are more often being included as key outcome indicators of recovery from addiction and across other disciplines (Edmondson et al., 200; Laudet & White, 2008).

Outcomes from the current study suggest that the road to recovery is challenging and fraught with many ups and downs, but those who continue to pursue recovery report that life does get better. It was hypothesized that well-being would improve over time for individuals on the road to recovery, but that episodes of relapse would have an immediate and negative effect on how people feel about their lives. While there are very few studies

examine the relationship between addiction or recovery and well-being, there is an abundance of evidence linking addiction and/or relapse to negative outcomes across multiple life domains that together inform a person's sense of well-being. Specifically, active substance abuse and episodes of relapse have been shown to have adverse effects on the physical health, mental health, interfere with individuals' ability to manage child rearing obligations, find employment, and maintain housing (NIAAA, 2000; Drake et al., 2008; Kessler et al., 2005; Regier et al., 1997; Copeland, 1997; Dennis, Foss & Scott, 2007). Given the far reach of the arm of addiction, it is likely that the well-being of individuals struggling with the symptoms of active addiction or episodes of relapse would experience diminished well-being.

Outcomes from this study offer evidence that well-being does improve over time, but before things get better, individuals reported an initial period of decline from wave 1 to wave 2. It is possible that this j-shaped trajectory reflects the tumultuous nature of the recovery process as evidence was also found to support the hypothesis that relapse would have an immediate and negative effect on well-being. We know individuals on the path to recovery must learn a new way to live, become well-versed in alternative coping strategies, find new friends, and find things to do with their time all while striving to be contributing members of society, caring for their children, holding down a job, and trying to keep stable housing. Accomplishing all this and sustaining sobriety is no easy task and it often takes multiple attempts to quit drinking or using substance before a person is able to achieve sustained sobriety for any duration of time. Findings from this study suggest that their efforts and hard work will pay off and life will get better if they can remain sober one day at a time.

It was somewhat surprising to find that change in well-being over time was unaffected by socio-demographic characteristics suggesting that well-being may be a particularly powerful and universal measure. However those who suffered from more sever addiction histories experienced deeper declines in well-being over the first year of the study. Interestingly when the trajectory reversed to reflect improvements those with more severe addictions experienced change at a quicker rate than those with less severe addiction histories. So much so that at the end of the 4 year period they had surpassed those who reported lower addiction severity ratings at baseline. This pattern may best be described by the old American proverb, "the harder you fall, the higher you bounce" (Jente, 1932). Those with more severe addiction histories are more likely to drop out of treatment, have a history of trauma, and perpetrate interpersonal violence (Melchior, Brown, Huba, & Panter, 2003; Baugh, 2000). Once they are finally able to achieve sobriety and are on the path to recovery, those with more severe addiction may be more likely to appreciate just how far they have come. While they may be in no better position than those with lower addiction severity levels, their realization of what they now have to lose may fuel an elevated sense of well-being.

Well-being is a new variable of interest being evaluated in the field of recovery. As such, it is no surprise that very few have begun to gather evidence describing the relationship between social forms of recovery capital and well-being. Beattie & Longabaugh (1997) integrated an array of social support and social network indicators into their research on interpersonal factors associated with post treatment drinking and well-being. They found that support for abstinence was associated with drinking outcomes, general social support was associated with subjective well-being, and the size

of a recovering alcoholic's sober network had no relationship to either drinking or well-being. Laudet & colleagues (2000) examined the relationship between social support, recovery status, and well-being among a sample of dually diagnosed individuals participating in Double Trouble Recovery meetings throughout New York City. Unlike Beattie & Longabaugh who didn't find a connection between recovery specific support and well-being, Laudet & colleagues concluded that higher levels of support for recovery were associated with higher levels of personal well-being.

Findings from the current dissertation study offer support for the outcomes reported by Laudet & colleagues, by offering evidence that support for recovery plays an integral role in the well-being of those recovering from addiction. Additionally, this study also found evidence that the size of a person's sober network has a significant influence on their well-being with those reporting larger sober networks also reporting higher well-being scores.

Cohen & Wills, 1985 conducted an extensive review of the literature to clarify how an array of social support constructs, stress (operationalized as either stressful life events or perceived level of stress), and well-being were related generally. When social support was operationalized to reflect the availability of resources or responsiveness to needs, a buffering model was endorsed such that social support was found to buffer the pathogenic influence of stress on well-being. However when social network characteristics such as the size of a person's social network are measured, they found evidence that network affiliation directly enhanced well-being. In the study presented here, perceived stress, but not stressful life events was found to be associated with well-

being such that the more stress someone experiences is associated with a decline in well-being. A direct effect model rather than a buffering model was endorsed by the findings.

Contribution to Theory and Knowledge-Building

This dissertation study has made several unique and important contributions to theory and knowledge building both in the field of recovery and beyond. At the core, this study sought to contribute to the development of a comprehensive theory of recovery that recognizes recovery as a multidimensional construct where sobriety is intertwined with multiple life domains in a synergistic process of change across the lifespan. The recognition that a comprehensive and holistic theory of recovery is needed was informed by the work of several well respected theorists and researchers. As William White and other theorists have called for the definition of recovery to be broadened, Alexandre Laudet and others researchers heard the call and are beginning to examine other possible outcome indicators relevant to the process of recovery. Laudet specifically has lead the way by seeking to better understand the relationship between sobriety and quality of life as well as seeking to evolve an improved understanding of the process of recovery and relevant stages within that process. The work of Dennis & colleagues (2007) has also been highly influential in guiding the field of recovery research and this study by bringing attention to the relationship between abstinence and a broad array of recovery outcomes including physical health, mental health, employment, social network, social support, and crime across the lifespan. Finally, this study sought to add to the evidence base on recovery capital and the life course perspective by shedding light on the relationship between social aspects of recovery capital, stress, and global health domains of recovery over a 4 year period of time.

Recognizing that social recovery capital and stress function as contextual elements shaping and influencing the process of recovery across the life span, outcomes from this study serves as additional evidence that the accumulation of social capital can influence multiple interlocking pathways of change (Cloud & Granfield, 2004). This study did not focus on specific turning points that shape trajectories and instead chose to gain valuable information about contextual elements that set the stage for turning points to be possible. We now know that the benefits of recovery specific support extend beyond sobriety to shape trajectories of physical health, mental health, and well-being. Sober network affiliation, while not directly associated with mental health outcome was found to influence the physical health and well-being of individuals in recovery. Not only was this the first time that the influence of social elements of recovery capital were examined in relation to outcomes other than sobriety, it is the first study to find that the density of a person's sober social network buffers the damaging effects of high levels of stress on mental health.

Implications for Practice and Policy

Treatment for addiction in the Unites States was designed to address the acute needs of those making the transition from active abuse of substances to a state of abstinence. Unfortunately the current system falls short and once it has helped someone achieve a short period of sobriety, individuals are discharged from treatment to alone face the trials and tribulations of the process of recovery. Recognizing that this approach fails to address the complex and chronic needs of those striving to recover from their addictions, a shift is beginning to take hold and recovery oriented systems of care are turning up in cities and communities across the nation. Recovery oriented systems of care call for

integration of formal treatment with informal services that span the addiction and mental health fields as a way to ensure recovering addicts get the help they over time when they need it. This shift is in its infancy, and there is great opportunity in the field of recovery research to introduce and evaluate new treatment or service approaches guided by the recognition that recovery is a process spanning the life course and that elements of recovery capital may play a profound role in the process of recovery across life domains.

Findings from this study draw attention to a very worrisome pattern of declining physical health for those recovering from addiction that mustn't be overlooked. Both from a prevention and treatment perspective the realization that the physical health of those recovering from addiction declines over time regardless of duration of abstinence, calls for an immediate response.

People have seen media campaigns depicting the ravages of addiction, but what is really needed is a media campaign that strives to help kids create new norms around having fun, playing sports, and managing social interacts that are substance free. As long as the super bowl continues to be dominated by beer commercials telling the world that fun can't be had without alcohol, and movies and TV shows that continue to depict adults reaching for a glass of wine or stiff drink after a hard day's work, people will turn to substances to mediate fun and to help them cope. What if instead alcohol was left out of the depiction of fun and sporting events? What if instead of reaching for a beverage the media were to show people going for a run or talking with others they trust to manage stressful times? Without re-calibrating the norms in society, other efforts to prevent the onset of addiction will be like swimming upstream.

From a treatment prospective a number of changes could be made that would improve the likelihood that recovering addicts would be able to experience healing and change across multiple life domains thus minimize the physical damage that evolved in relation to their abuse of substances. First, medical providers need to be armed with best practices for detection of addiction and they need access to an array of services where they can refer patients to get help to get and stay sober as well as manage their mental health care needs. Medical providers often report high levels of frustration with their addicted patients because of frequent noncompliance with care recommendations and drug seeking behaviors. It is time that medical providers are armed with an arsenal of strategies to care for this very complicated and difficult population. A good first step for medical providers might be to organize and facilitate discussion to generate new and innovative strategies for caring for this complicated population. Without such change, individuals in recovery will remain ticking time bombs on the verge of explosion and death.

As ROSC are being designed and implemented across the nation, it is critical that medical providers be fully integrated into the system. Extending the network of care to include medical providers and making sure providers of all kinds have knowledge about the vast array of available service options, including mechanisms for referrals, will ensure that together we are doing all we can to improve outcomes for those recovering from addiction. When everyone is at the table it becomes possible for resources to be shared, expenses to be managed more effectively, and people to get what they need to recovery.

Already valued within ROSC are recovery support organizations and service providers that offer interventions around homelessness/housing, employment, education,

and job training, peer coaching, and peer support. While these services offer critical help to those recovering, there is an abundance of opportunity to evolve recovery support services to offer more diverse options that will support individuals on their individual paths to recovery. This study has highlighted the immense value of social recovery capital on multiple life domains over time, and suggests that recovery support services designed to enhance support for recovery and sober network affiliation may have a profound effect on the lives of those recovering from addiction.

An example of an innovative sober network intervention designed to enhance recovery support and coping skills to manage stress is Phoenix Multisport (PM). PM seeks to transform the norms surrounding substance use by making living a substance free lifestyle fun and rewarding. This innovative organization offers free programming for anyone with 48 hours of sobriety and was designed to work with individuals of any age and at any stage in the recovery process. They pick up where formal care and other recovery support services leave off by bringing individuals in recovery together to form a community of like individuals who support one another in living a healthy substance free lifestyle. On New Year's Eve, instead of going to a bar or party and getting drunk, PM member go ice climbing, snow shoeing, or skiing. They ring in the New Year together while swimming in local hot springs. The potential of innovations like this to alter the profound and continuous decline in health over time experienced by individuals on the path to recovery is tremendous.

Finally, this study also brings attention to the disproportionate number of women whose physical and mental health suffer disproportionately more than men in the face of addiction. Evidence from this study suggests utilization of a gendered lens in designing

services to meet the unique needs of women is critical. Women would best be served by using a multifaceted approach that includes both prevention and treatment interventions, and is grounded in gender and power theory. Interventions guided by a gender-informed perspective have shown particular promise in addressing the needs of women broadly and more specifically those suffering from addiction and other health concerns such as HIV/AIDS (Haddock, Zimmerman, & MacPhee, 2007, Wingood & DiClemente, 2000; Wechsberg, Lam, Zule & Bobashev, 2004). From a prevention standpoint, shaping interventions to target enhancement of self-confidence and self-worth may prove particularly powerful in helping women learn to say no to male partners enticing them to initiate abuse of substances, and in helping them to avoid situations where they are at risk for being sexually exploited, violated, or pressured into engaging in high risk sexual behaviors.

Finally, from a policy perspective it is also imperative to maintain a gendered lens when enacting policies serving women and families. The Patient Protection and Affordable Care Act soon to be implemented in the US will guarantee women access to health insurance and health care. This policy alone is likely to significantly improve the lives of women. While this is a critical first step, it is also important to seek policy change that supports women who are in the head of household role by providing assistance with child care and housing support so that they can participate in health or addiction treatment as needed without the threat of losing their home or their children.

Limitations

Although this study benefitted significantly from being longitudinal in design, there are a number of limitations that interfere with the ability to generalize the findings

more broadly to the larger population of individuals striving to recovery from addiction. Analysis for this study was conducted utilizing secondary data which in and of itself has inherent limitations such as the fact that there was no control over who was chosen to participate, what constructs were measured, or how they were operationalized (Greenhoot & Dowsett, 2012).

The non-random sample utilized for this study consists of individuals residing in NYC, who reflect an urban and often underserved population and whose substances of choice tended to be crack and heroin (Laudet & White, 2008). It is impossible to extend the results of this study to recovering individuals residing in rural settings, those who have access to a larger pool of services, or those whose primary addiction is to alcohol, prescription medications, or other controlled substances.

This data set was rich with measures relevant to recovery research and offered a good match to the specific needs of the study at hand. However, not all the variables included in the study were measured optimally or consistent with how other researchers have operationalized the constructs. While researchers have linked the size of a person's social network with abstinence, other researchers have used percentage or proportion measure to reflect the number of folks in one's network who are active users in relation to those who are living sober (Bond, Kaskutas, & Weisner, 2003; Buchanan & Latkin, 2008; Mohr, Averne, Kenny & DelBoca, 2001). Utilization of secondary data allows you to begin to answer critical questions, but often it is necessary to take the next step and design research with your specific questions in mind.

Outcomes are also understood to be more robust when validated and reliable metrics are used to operationalized constructs rather than single questions (Bowling,

2005). While the single item measures for SAPH has shown good predictive ability across populations and constructs, multi-item measures offer a more comprehensive profile and may be more informative in relation to tracking change over time in relation to specific dimensions of health (Mabe & West, 1982; Bowling, 2005). Secondary data analysis may not be ideal, but it does offer opportunities for research that would not be available otherwise.

Future Research

There are numerous avenues of future research that may prove valuable in the development of a comprehensive and holistic theory of recovery. The field of recovery research is very new and understood as a distinct divergence from the pool of research on addiction causes, treatment modalities, and treatment outcomes. A comprehensive theory of recovery begins when someone initiates sobriety for the first time and extends across the life course. As such it integrates as a starting point the vast pool of research on addiction, but moves beyond addiction to develop a more comprehensive understanding of how people recovery. As such, opportunities for study within this evolving field of research are many.

To start with it is critical that a better understanding of what recovery is be established. Researchers can contribute to this by both seeking to understand from those engaged in the process of recovery what recovery means to them, as well as studying those who have managed to sustain sobriety long term and recover more broadly to gain an understanding of what contributed to their success. This sort of research calls for long term longitudinal studies that incorporate a vast array of recovery indicators.

Researchers also should be encouraged to gather evidence about which domains of recovery proposed by theorists and recovering individuals in fact contribute to improved recovery outcomes over time, and how those domains interact with one another over time. This type of analysis would best be served by utilizing a life course perspective. Utilizing a life course perspective to frame the process of recovery allows for the identification of common experiences that trigger turning points. The life course perspective will also be helpful in framing analysis that seeks to identify phases or stages of recovery and factors that differentiate them.

Another vein of research that may prove to be particularly relevant and have significant influence on the development of a comprehensive theory of recovery is the evolution of our understanding or what role recovery capital plays across recovery domains and over time. It has been suggested that recovery capital offers context within which turning points are triggered and change occurs (Cloud & Granfield, 2004). As such it is critical that through research we gather evidence to clarify which elements of recovery capital matter, when in relation to phases or stages of the change process they matter most, and how they influence domains of recovery and provide the context for change. Within the examination of recovery capital it is also suggested that clarification be sought as to whether recovery specific aspects of support contribute to outcomes above and beyond that of general social support.

Conclusion

In the words of Chip Wilder, one of the best clinical supervisors in the field of clinical social work, “Neither success nor failure are inevitable”. The same is true for those recovering from addiction. Regardless of the fact that recovering from addiction is

a hard process fraught with stress and compromised functioning across multiple life domains, most are able to put together periods of sustained abstinence. However, sobriety alone does not equate to recovery. For those suffering from comorbid physical and mental health conditions, the road to recovery beyond sobriety alone is plagued by numerous challenges. While outcomes from this study suggest the physical health of those recovering from addiction is in a constant state of decline over time, we have the opportunity through research and innovative intervention strategies to change that course. Through innovation and research we can also chip away at the disproportionate suffering that seems inherent with being a woman in today's society.

This study has contributed to the development of a fuller appreciation of how recovery capital and more specifically social recovery capital, influence global health domains of recovery over time. The relevance of the findings from this study extends across disciplines to inform the development of a comprehensive theory of recovery and innovation in design of policy and interventions to support individuals on their individual quests to recovery from addiction.

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